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THE FATE OF EXTRACORPUSCULAR CIRCULATING HAEMOGLOBIN

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At the present time, when so much work is being done on blood transfusion and blood substitutes, the following observations may be of interest in throwing some light on the fate of extracorpuscular circulating haemoglobin. This is especially so since, though the biological relationship of haemoglobin to bilirubin and its subsequent excretion as bile pigment have been established, the relationship between haemoglobin and haematin in normal and pathological conditions in man is less well understood.

I. INTRAVENOUS INJECTIONS OF HAEMOGLOBIN

Duesberg (1934), in an attempt to explain the significance of haematin, as revealed by Schumm's test, in the serum of cases of pernicious anaemia, injected haemoglobin as well as haematin solutions intravenously into man. Amounts of haemoglobin varying from 2 to 6 grammes were injected intravenously. A rise in bilirubin was noted within thirty minutes and the maximum concentration was reached in two to three hours; bilirubin values returned to a normal level after five to eight hours in patients with healthy livers; where the liver was diseased it took eight to twelve hours to return to the original level.

After the injection of 3 to 6 grammes of haemoglobin intravenously Schumm's test was negative even when serum was examined through a depth of 4 cm., except in patients with certain diseases of the liver. Out of ninety-eight patients receiving haemoglobin injections there was only one whose serum gave a positive Schumm reaction in the absence of demonstrable liver disease: this patient had a high blood pressure with transient cerebral attacks. Duesberg (1934) concluded that the occurrence of haematinaemia was dependent on hepatic function, and that in the absence of parenchymatous degeneration of the liver circulating haemoglobin did not give rise to haematinaemia.

As these experimental results were not in conformity with certain recent biochemical findings in the haemoglobinurias and haemolytic anaemias it was decided to repeat Duesberg's experiments, injecting larger quantities of haemoglobin and making quantitative determinations of the resulting haemoglobinaemia, as well as serial van den Bergh and Schumm tests.

Technique Adopted

Quantitative Haemoglobin Determination.—To determine the intensity of the haemoglobinaemia a method was used similar to that of Bloem (1933), in which the minimum concentration at which the α band just disappears from standard solutions of haemoglobin was estimated; to determine the concentration of haemoglobin this value was multiplied by a dilution factor ascertained for the particular specimen of plasma under investigation. The method has been described in detail by Fairley and Bromfield (1933) and calls for no further comment, except to point out that the plasma haemoglobin must exceed a concentration of 0.12%, or 16.1 mg. per 100 c.cm., before it is significant of haemoglobinaemia, and 25 mg. where no special precautions are adopted to reduce plasmolysis to a minimum. Quantities of haemoglobin below these values may be caused by plasmolysis and cannot be regarded as significant.

Bilirubin Estimations.—Owing to the presence of haemoglobinaemia the original van den Bergh technique was followed by precipitating the plasma proteins with alcohol before adding the diazo reagent. As pointed out by Harrison (1930), this has the advantage over the modified technique of Thannhauser and Andersen of removing the haemoglobin before the addition of the diazo reagent and so avoiding the formation of acid haematin, which makes it difficult to match the standard. It has the possible disadvantage that an unknown quantity of bilirubin is precipitated with the albumin, and this may be the reason why the bilirubin values are not higher in this series of cases. This is suggested by the fact that Pedersen and Waldenström (1937) found on the ultracentrifuge that both forms of bilirubin—i.e., that which couples directly with diazo reagent and that which reacts only indirectly after the addition of alcohol—are bound to serum albumin. Bensley (1934), on the other hand, states that there is fairly general acceptance that loss of bilirubin due to occlusion in the protein precipitate does not occur or is negligible when there is no "direct" bilirubin in the blood, and that where only "indirect" bilirubin is present no significant differences are found between values obtained by the original van den Bergh technique and those obtained by the method of Thannhauser and Andersen.

Schumm's Test.—This test, first introduced by Schumm (1912a, 1912b), has been widely used in clinical medicine to demonstrate haematin in plasma. A considerable literature on haematinaemia has developed on the basis of this test, but recent work done by me indicates that in man haematin does not exist free in human plasma, as it combines with serum albumin to form methaemalbumin. The technique used was as follows:

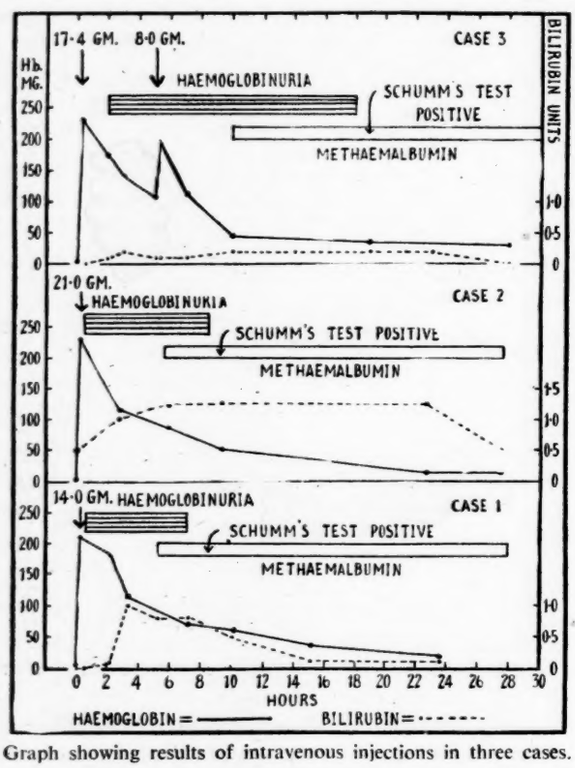
A given volume of plasma was covered with a layer of ether; one-tenth the volume of concentrated ammonium sulphide (analar) was then run in with a pipette and subsequently mixed by shaking. A positive reaction is indicated by the appearance of a haemochromogen with a sharply defined α band at 558 mμ in a depth up to 4 cm. of plasma. The presence of much haemoglobin adds to the difficulty of performing the test, since reduced haemoglobin is formed which obscures the haemochromogen bands. In addition specimens of plasma were examined in Harrison's (1938) apparatus to a depth of 6 to 10 cm. for spectroscopic evidence of methaemalbumin.

Preparation of Haemoglobin Solutions.—The haemoglobin used for the injections was prepared from citrated normal human blood; the plasma was pipetted off after centrifugalization and the corpuscles washed in physiological saline. The sedimented corpuscles were then haemolysed by adding four times the volume of sterile doubly distilled water and stromata were removed by centrifugalization. Sterile NaCl was added to make the haemoglobin solution isotonic with blood; it was subsequently left in the ice-room overnight and centrifuged next morning, when any remaining stromata were separated. The haemoglobin was finally estimated by Haldane's method, 100% corresponding to 13.8 grammes haemoglobin per 100 c.cm.

Case Histories

The patients receiving these haemoglobin injections were all convalescent. Preliminary alkalization of the urine was established before the injections, and in each case the urine was kept alkaline to litmus for the next twenty-four hours by the hourly or two-hourly administration of a potassium citrate and sodium bicarbonate mixture.

Case 1.—A man aged 23 had been admitted to hospital with an injury to his thumb and ankylostomiasis, which was successfully treated. He received 14 grammes of haemoglobin, or 280 mg. per kg. of body weight, intravenously. No untoward reaction followed. The injection took fifteen minutes, and at completion blood was withdrawn and the plasma found to contain 208 mg. haemoglobin per 100 c.cm. of plasma. Thereafter the haemoglobinaemia progressively decreased, as shown in the graph (Case 1). Schumm's test was positive in



Graph showing results of intravenous injections in three cases.

plasma collected 5 hours 10 minutes after the injection, and it remained strongly positive up to twenty-eight hours, the α band at 558 mμ being clearly defined in a depth of from 0.1 to 1 cm. No further observations were made. Methaemalbumin was never demonstrated spectroscopically. The haemoglobinuria was found within thirty-five minutes and disappeared after seven hours. The first specimen of urine was slightly alkaline to litmus and contained oxyhaemoglobin, a trace of methaemoglobin, and a few granular casts. The second specimen also contained both oxyhaemoglobin and methaemoglobin; but the remainder, which were all definitely alkaline to litmus, showed only oxyhaemoglobin up to seven and a quarter hours; no haemoglobin was visible spectroscopically in any subsequent specimens—even in a depth of 10 cm. The blood urea varied between 32 and 36 mg. per 100 c.cm. throughout the experiment. Bilirubin estimations showed a rise to 1 unit (indirect) about three and a half hours after the haemoglobin was injected and 0.5 unit at ten hours. It subsequently fell to 0.1 unit, as shown in the graph.

Case 2.—A man aged 49 was admitted to hospital with cirrhosis of the liver, intermittent claudication, and a streptococcal infection of the urinary tract. The last-named was effectively treated with proseptasine. The patient received 21 grammes of haemoglobin, or 280 mg. per kg. of body weight, intravenously. The injection took fifteen minutes; blood was then withdrawn and the plasma was found to contain 230 mg. of haemoglobin per 100 c.cm. The subsequent fall in haemoglobin concentration is shown in the graph (Case 2) The first specimen of urine was passed thirty-five minutes after the injection and was found to be alkaline to litmus and to contain much oxyhaemoglobin and a few granular casts, but no methaemoglobin. Haemoglobinuria persisted for 8 hours 50 minutes. During this period the urine was invariably alkaline to litmus, and on the last four occasions contained a trace of methaemoglobin, though this was only visible spectroscopically when examined through a depth of 6 cm. Schumm's test was first found to be positive 5 hours 50 minutes after the injection began, and continued to be positive for twenty-two and a half hours, the α band at 558 mμ being demonstrable spectroscopically through a thickness of 0.1 to 2 cm. of plasma. When next examined at twenty-eight hours the reaction was negative. Methaemalbumin was never demonstrable spectroscopically in plasma even in a depth of 6 cm. The bilirubin content of the plasma was 0.5 unit (indirect) before the injection; it rose to a maximum of 1.25 units five and three-quarter hours later. Nausea and mild fever (100° F.) developed some hours after the injection, but the temperature was normal in twenty-four hours, and nausea disappeared when the bicarbonate–citrate mixture was stopped.

Case 3.—A man aged 35 years was admitted to hospital with ascariasis and syphilis, for which he received effective treatment. An injection of 17.4 grammes of haemoglobin, or 350 mg. per kg. of body weight, was given intravenously. No adverse reaction followed the injection, which took thirty minutes. Blood collected at this time showed 230 mg. of haemoglobin per 100 c.cm. plasma. Thereafter the haemoglobinaemia decreased as shown in the graph (Case 3). Some five hours after starting the first injection a second intravenous injection of 8 grammes of haemoglobin, or 160 mg. per kg., was given. Immediately following this injection the haemoglobin in the plasma rose from 106 mg. to 198 mg. per 100 c.cm. The first specimen of urine was obtained in two hours; it was alkaline to litmus and contained oxyhaemoglobin and methaemoglobin. Haemoglobinuria persisted for at least sixteen hours. During this period the urine remained alkaline; oxyhaemoglobin was always present and methaemoglobin invariably absent. The plasma gave a doubtful Schumm reaction seven hours after injection and was strongly positive at ten hours, the α band of haemochromogen being evident in a thickness of 0.2 cm. This remained positive for thirty-four hours. The rise in bilirubin was so slight as to have no significance. The blood urea varied between 32 and 36 mg. per 100 c.cm.

Comment

The number of cases investigated along these lines was curtailed by the outbreak of war, otherwise the series would have been extended and larger quantities of haemoglobin injected in order to determine what amount was necessary to produce a concentration of methaemalbumin sufficient to be demonstrated spectroscopically.

Haemoglobinaemia.—The amount of haemoglobin injected was 280 mg. per kg. of body weight in the first two patients, while the third received two injections—350 mg. and 180 mg. per kg. The maximal concentration of haemoglobin at the end of the injections varied from 208 to 230 mg. per 100 c.cm. The fall was subsequently rapid, but persisted in sufficient concentration to give rise to haemoglobinuria lasting 7 hours in Case 1, 8 hours

50 minutes in Case 2, and 16 hours in Case 3, the recipient of the two injections. The quantity of the haemoglobin present in the plasma at the termination of the haemoglobinuria was 69 mg. in Case 1, 51 mg. in Case 2, and 37 mg. in Case 3. The renal threshold for haemoglobin lay somewhere between 37 and 102 mg. per 100 c.cm. for the series, but more extended observations would be necessary to establish this value with reasonable accuracy.

Bilirubin.—The bilirubin determinations were not considered satisfactory for the technical reasons already given, but quite definite and sustained increases in bilirubin were observed in Cases 1 and 2, which confirmed the observations of Duesberg in this regard. Furthermore, the elevation of bilirubin in Case 2, with cirrhosis of the liver, lasted twenty-two hours and was more prolonged than in Case 1, which lasted ten hours; this finding was not unexpected, since the concentration of indirectly reacting bilirubin (haemobilirubin) in the blood is dependent not only on the rate and amount of blood destruction, but on the functional capacity of the liver to excrete the circulating haemobilirubin as bile pigment. The rise in bilirubin in Case 3 was too small to be of any significance.

Schumm's Test.—In contradistinction to Duesberg's negative findings it will be observed that the plasma of all three cases gave a positive reaction within four to ten hours, and that this persisted for twenty-seven to thirty-four hours from starting the injection, the α band of haemochromogen being demonstrable at 558 mμ in a thickness of from 0.1 to 2 cm. of plasma. Duesberg (1934) used a maximum of 6 grammes of haemoglobin for his patients weighing 75 kg., and the disparity in results must be attributed to the larger quantities of haemoglobin injected, which in the present series of cases were 14, 21, and 25.4 grammes respectively.

Methaemalbumin.—In all three cases the plasma was examined with the reversion spectroscope for the presence of methaemalbumin in a maximum depth varying from 6 cm. to 10 cm. An α band in the red portion of the spectrum was never observed. No opportunity has been forthcoming for injecting larger quantities of haemoglobin, but in two patients (Cases 4 and 5) receiving incompatible blood transfusions containing approximately 90 and 45 grammes of haemoglobin respectively, methaemalbumin was demonstrable spectroscopically in both instances.

The demonstration of methaemalbumin, whether spectroscopically or by Schumm's test, is dependent on its concentration in the plasma, but the latter method is more sensitive than the former. The concentration is determined by the amount of circulating extracorpuscular haemoglobin and the efficiency of the various mechanisms for its elimination, which will be referred to later. Once methaemalbumin has formed its elimination appears to be via the liver, dysfunction of which results in an increased concentration in the blood.

II. INCOMPATIBLE TRANSFUSION

Two cases of incompatible transfusion were investigated. In one the recipient (Group O (IV Moss)) was transfused with a Group B (III) blood; owing to depreciation in titre of the Group A (II) typing serum the donor was classified erroneously as Group O instead of B. In the other case the typing error was not determined with certainty.

Case 4.—A man aged 68 was gravely ill with what had been regarded as a post-sprue megalocytic anaemia. R.B.C., 960,000 per c.mm.; haemoglobin, 12% (Haldane); colour index, 0.7. Average diameter of corpuscle, 8.6 μ. Megalocytosis marked. Bilirubin, 1.5 units (indirect); blood urea, 33 mg. per 100 c.cm. Shortly after being transfused with 37½ ounces of citrated blood the temperature rose to 102.6° F., and subsequently port-wine-coloured urine was passed containing oxyhaemoglobin and methaemoglobin. Some fourteen and a half hours after transfusion the patient was jaundiced; the bilirubin reached 12 units (indirect) and the blood urea 68 mg. per 100 c.cm.; thirty-nine hours later the bilirubin equalled 10.5 units and the blood urea 132 mg. Examination of the plasma on the reversion spectroscope showed a three-banded spectrum with an α band in the red at 623 mμ, a β band at 578 mμ, and a γ band at 540 mμ. This resembled methaemoglobin, but was really a composite spectrum, the α band being due to methaemalbumin and the β and γ bands corresponding to the α and β bands of oxyhaemoglobin. The patient died with anuria within forty-eight hours of the transfusion. The post-mortem diagnosis was pernicious anaemia complicated by intravascular haemolysis associated with an incompatible blood transfusion. The heart was large (16 oz.), fatty, and flabby; the liver (68 oz.) was ochre-yellow and fatty; and the gall-bladder was greatly distended with thick black bile the consistency of treacle. Early consolidation of the base of the right lung was present. Histopathological investigation showed typical blockage of the renal tubules with eosinophilic debris, some degenerative changes in the lining tubular epithelium, and much haemosiderin in the parenchyme cells of the spleen, liver, and kidneys.

Case 5.—A woman aged 55 was admitted with anaemia following haemorrhage from a fibroid. On the night of June 22, 1937, when a blood transfusion was being given previous to operation, she became shocked, and developed tightness in the chest, a rash on the arms, and swelling of the hands. Three extremely loose bowel actions followed. Next morning the patient, who was passing dark red urine, was jaundiced and very ill. Laboratory investigations were made on June 23. The plasma obtained in the morning was a dark golden-brown colour. There was the usual three-banded spectrum, with an α band at 623 mμ, a β band at 578 mμ, and a γ band at 540 mμ. Unlike the α band of methaemoglobin it was not dispersed with Stokes's reagent or 10% ammonium sulphide; it was completely dispersed with strong ammonium sulphide, but formed a haemochromogen with the prominent α band at 558 mμ. Bilirubin amounted to 2.5 units (indirect), and the blood urea to 100 mg. per 100 c.cm. The urine at 5.30 p.m. was very dark red in colour, was acid in reaction, and contained 84 mg. of haemoglobin and 724 mg. of methaemoglobin per 100 c.cm. The deposit showed hyaline, granular, and epithelial casts. Plasma collected at the same time revealed methaemalbumin. Blood urea amounted to 115 mg. per 100 c.cm. On June 24 urine collected at 7 p.m. was alkaline and still contained oxyhaemoglobin but no methaemoglobin. Next day the plasma contained no oxyhaemoglobin or methaemalbumin, and the blood urea was 168 mg. per 100 c.cm. After a severe illness the patient recovered.

III. INTRAVENOUS INJECTIONS OF HAEMATIN IN MAN AND MONKEYS

In a recent series of observations on man and monkeys receiving intravenous injections of alkaline haematin (ferric)* the finding of Duesberg (1934) that there was no increase in circulating bilirubin was confirmed by me. Duesberg's findings regarding experimentally induced haematinaemia in man were, however, not verified, inasmuch as the pigment present in the circulating blood proved to be methaemalbumin and not haematin. The experimental evidence supporting this view is being reported in another communication, but it might be pointed out here that the spectrum was typical of methaemalbumin, the α band being situated at 623 mμ and not at 616 mμ, which was the position of the α band in the alkaline haematin injected. The α band in the red was not altered by Stokes's reagent or 10% ammonium sulphide, but it was dispersed with concentrated ammonium sulphide, a haemochromogen being formed with a well-defined α band seen at 558 mμ (Schumm's test).

* The alkaline haematin (ferric) was prepared by adding just enough sodium hydroxide or sodium carbonate to pure haemin in saline to dissolve it completely. The dosage in man was 4 mg. per kg. and in monkeys 12.5 to 20 mg. per kg. of body weight.

The pigment was also found to be concentrated in the albumin fraction of the serum, and on reduction with sodium hydrosulphite yielded the typical double-banded spectrum of haemalbumin (ferrous), and not the broad single-banded spectrum of reduced haematin. On treatment with sodium hydrosulphite and CO, carboxyhaemalbumin was formed, having a spectrum which closely resembled but was not identical with carboxyhaemoglobin. On treatment with sodium hydrosulphite and 10% sodium hydroxide a haemochromogen with an α band at 558 mμ was produced.

Identical results were obtained with monkeys of the species *Macacus rhesus*, *Macacus sinicus*, and *Cercopithecus aethiops* injected with alkaline haematin (ferric). When injections of reduced alkaline haematin (ferrous) were given intravenously, methaemalbumin also appeared; evidently the reduced haematin (ferrous) was oxidized in the blood stream to haematin (ferric), which united with serum albumin to form methaemalbumin.

IV. DISCUSSION

The conclusion reached from these investigations as well as from an extensive clinical study of the haemoglobinurias and haemolytic anaemias is that extracorpuscular circulating haemoglobin is treated as a foreign substance in the body, which disintegrates and eliminates it in as short a time as possible. Three mechanisms, depending on the concentration of extracorpuscular haemoglobin attained in the circulation, may be called into action for this purpose. They are: (1) absorption by the reticulo-endothelial system; (2) intravascular katabolism of haemoglobin; (3) renal excretion.

Absorption by the R.-E. System.—Effete or damaged corpuscles are phagocytosed and circulating extracorpuscular haemoglobin is absorbed by the reticulo-endothelium, the end-products of intracellular katabolism of the haemoglobin being bilirubin and haemosiderin. Lemberg (1937) has suggested that haemoglobin is first transformed in R.-E. cells into an unstable protein-haemochromogen which is rapidly oxidized to verdo-haemochromogen. The latter compound then loses its iron together with protein, which may remain combined to give rise to iron-containing "haemosiderin" proteins. Thus biliverdin is formed and undergoes reduction to bilirubin partly in the R.-E. cells and the remainder in liver cells. With slight degrees of intravascular haemolysis, or where only small amounts of haemoglobin are injected into the circulation (5 grammes), this is probably the only mechanism involved. In such circumstances biochemical investigation shows some degree of hyperbilirubinaemia, a negative Schumm test, and an absence of methaemalbuminaemia.

Intravascular Katabolism of Haemoglobin.—Where intravascular haemolysis is more marked, biochemical investigation reveals not only hyperbilirubinaemia but also a positive Schumm test and methaemalbuminaemia. The concentration of these pigments is increased if there is an associated degeneration of the polygonal cells of the liver. In addition to the intracellular disintegration of haemoglobin already referred to there is now an extracellular katabolism of haemoglobin in the circulation; haematin (ferric) is formed, combining with serum albumin to form methaemalbumin. When human plasma–haemoglobin mixtures are incubated at 37° to 40° C. neutral and alkaline methaemoglobin are demonstrable before methaemalbumin appears; this suggests that the extracorpuscular haemoglobin may be first oxidized to methaemoglobin, which is subsequently split into globin and haematin (ferric), the haematin uniting with serum albumin to form methaemalbumin. On the other hand, in a severe intravascular haemolysis, such as occurs in blackwater fever, no spectroscopic evidence is available that methaemoglobin in demonstrable quantity does precede the formation of methaemalbumin. In monkeys receiving intravenous injections of reduced haematin (ferrous) methaemalbumin appears in the blood. It may therefore be that, *in vivo*, circulating extracorpuscular haemoglobin is first split into globin and reduced haematin (ferrous), and the latter pigment is subsequently oxidized to haematin (ferric), which immediately combines with serum albumin to form methaemalbumin. The balance of evidence so far available favours this view. Rimington (1939) has found in both man and animals that faecal porphyrin is increased after haematin injections, and has suggested that the prosthetic group of methaemalbumin is eliminated via the liver as Series III porphyrin in the faeces.

Renal Excretion.—The third mechanism to be brought into play is renal excretion of oxyhaemoglobin, and, as is well known, haemoglobinuria develops only when the concentration of extracorpuscular haemoglobin is sufficient to exceed the renal threshold. Baker and Dodds (1925) found on injecting haemoglobin into rabbits that, provided the urine was alkaline in reaction, the oxyhaemoglobin remained in solution unchanged and no blockage of the tubules resulted. Clinical observation supports this view. When the urine is acid, methaemoglobin and, later, acid haematin are formed. Haematin is deposited in the tubules either as acid haematin or as haematin combined with some nitrogenous base or protein, and if sufficient nephrons are blocked anuria results. Anuria with uraemia is the common cause of death in any severe intravascular haemolysis in man. For this reason routine preliminary alkalization of the urine is a sound procedure in all blood transfusions, while the immediate alkalization by massive intravenous injections of citrates, as recently advocated by Bushby, Hart, Kekwick, and Whitby (1940), is indicated in any condition immediately haemoglobinuria appears. The lack of untoward symptoms or severe reaction following the injection of human haemoglobin in a dosage of 280 to 350 mg. per kg. of body weight is of interest, and is undoubtedly related to the alkalization of the urine which was carried out before the injection in each case.

Summary and Conclusions

Following the intravenous injection of 14 to 25.4 grammes of human haemoglobin in man a positive Schumm reaction was invariably demonstrated in the plasma within four to ten hours, and persisted for twenty-four hours or longer.

A transient increase in bilirubin was also noted in the plasma in two of the three cases receiving haemoglobin injections.

Though methaemalbumin was not found spectroscopically following the injection of haemoglobin in these amounts, it was demonstrated in the plasma of two patients who received by mistake incompatible blood containing approximately 45 and 90 grammes of haemoglobin respectively.

In incompatible transfusion and the other intravascular haemolyses in man, methaemalbumin and not methaemoglobin is found in the plasma; a mixture of the two pigments has never been recorded *in vivo*, though they do occur together *in vitro* when a human plasma–haemoglobin mixture is incubated at 37° C.

Extracorpuscular circulating haemoglobin may be (*a*) excreted by the kidney, (*b*) absorbed by the R.-E. cells with the production of bilirubin and haemosiderin, and (*c*) katabolized in the circulation with the production of methaemalbumin.

It is suggested that haemoglobin disintegrating in the circulation is first split into globin and reduced haematin (ferrous); the latter pigment is immediately oxidized to haematin (ferric), which in man combines with serum albumin to form methaemalbumin.

I wish to express my indebtedness to Dr. C. M. Wenyon, F.R.S., for laboratory facilities for continuing this work at the

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A RAPID METHOD OF DIFFERENTIATING CHILDREN WITH LARGE OR SMALL RESERVES OF VITAMIN C*

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Previous tests of adequacy of vitamin C storage based on urine analysis have in general been unsuitable for wide use on subjects other than hospital patients owing to the desirability of testing a twenty-four-hour specimen. Abbasy and Harris (1937a) suggested a modification of their original method in which three-hour specimens were tested on two successive days. On the third day, and the fourth if necessary, they gave a test dose of ascorbic acid, and the urine passed four to seven hours after was analysed. The present experiments were carried out to discover if the measurement of the concentration of vitamin C in a single specimen of urine passed four hours after a test dose of ascorbic acid would reveal reliable information regarding the vitamin C reserves of the subject tested.

Experiment on Concentration of Vitamin C in Urine of Normal Adult

The first of the two experiments was designed to show the variations in concentration of vitamin C in the urine from specimen to specimen and from day to day in a normal healthy adult male before and after a test dose of ascorbic acid. This subject (J. P.) had a diet which included fresh fruit at least once a day and which contained on the average approximately 70 mg. of ascorbic acid daily. This figure was derived from an analysis of a detailed record of the diet for one week. Each specimen of urine passed during a period of seventeen days was measured and its concentration of vitamin C determined. On the ninth day a test dose of ascorbic acid—700 mg.—was taken by mouth. The data derived from this experiment are summarized in Tables I and II and in Chart 1. It will be seen that the average concentration of vitamin C in the specimens before the test dose was 1.72 mg. per 100 ml. In 76 per cent. of these specimens the concentration lay between 0.76 and 2 mg. per 100 ml. When the concentration rose to levels of 3 to 6 mg. per 100 ml. extra quantities of fruit had been consumed. That the concentration of vitamin C is not directly dependent on the volume of the specimens is shown in Table II. The effect of a large test dose of ascorbic acid (70 mg. per stone of body weight) on the concentration of vitamin C in subsequent specimens of urine is shown in Chart 1.

* This research was carried out in connexion with the Carnegie United Kingdom Trust dietary and nutritional survey.

TABLE I.—*The Excretion of Vitamin C by an Adult Male Weighing 10 st. on a Daily Intake of Approximately 70 mg. and the Response to a Test Dose of 700 mg. Ascorbic Acid*

Duration of observation period	17 days
Number of specimens of urine passed	114
,, ,, ,, ,, ,, ,, before test dose (8 days)	55
Average daily urinary excretion	1,495 ml.
Range in volume of specimens	40 to 520 ml.
Average concentration of vitamin C in specimens before test dose of ascorbic acid	1.72 mg. per 100 ml.
Range in concentration of vitamin C in specimens before test dose	0.76 to 6.5 mg. per 100 ml.
Total urinary excretion, showing the diuretic effect of ascorbic acid :	
On day of test dose	2,140 ml.
On day following test dose	1,980 ml.
Average total daily excretion of vitamin C before test dose (8 days)	22.8 mg.
Range of total daily excretion of vitamin C before test dose	13.8 to 29.1 mg.
Maximum concentration reached 6 hours after test dose	27.7 mg. per 100 ml.
Total amount of vitamin C excreted in 12 hours following test dose	245.1 mg.
Percentage of test dose excreted in 12 hours following administration	35%

TABLE II.—*Showing Lack of Relation between Volume of Specimen and Concentration of Vitamin C*

Time	Volume of Specimen (ml.)	Concentration of Vitamin C (mg. per 100 ml.)
1st day :		
8.30 a.m.	485	1.23
9.45 a.m.	55	1.21
12.30 p.m.	155	1.49
1.45 p.m.	75	1.63
4.30 p.m.	175	1.84
6.0 p.m.	110	1.41
8.0 p.m.	90	2.83
11.15 p.m.	580	1.43
2nd day :		
8.30 a.m.	400	1.94
12.30 p.m.	110	2.11
2.0 p.m.	90	1.85
4.50 p.m.	215	1.85
6.0 p.m.	175	0.89
7.0 p.m.	145	0.77
9.30 p.m.	460	1.91
10.0 p.m.	95	4.67

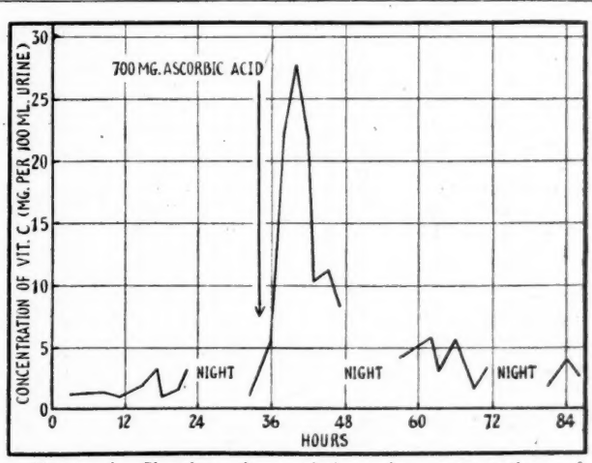

CHART 1.—Showing the variations in concentration of vitamin C in successive specimens of urine in a male adult before and after a test dose of ascorbic acid.

Following the marked increase in concentration of vitamin C in the urine on the day of the test dose the concentration fell rapidly, and on the third day after the test dose the concentration in five out of six specimens was less than 2.3 mg. per 100 ml. By the eighth day all the concentrations were less than 2 mg. per 100 ml., and the total daily excretion was 19.9 mg. During the week following the test dose increases up to 7 mg. per 100 ml. occurred on several occasions after the consumption of small amounts of fruit, showing a high degree of saturation in the tissues.

Method of Analysis Used

The method of analysis employed in determining the concentration of vitamin C in the urine was the same as that described by Harris and Ray (1935). Each specimen

of urine was acidified with glacial acetic acid to 10 per cent. by volume and was stored in the dark. The urine was titrated into a freshly prepared solution of 2:6-dichlorophenol-indophenol, 5 ml. = 0.1 mg. ascorbic acid, and the end point, decoloration, was reached within two minutes. All specimens were analysed within twenty-four hours and the average of two titrations was taken in each case.

The method has been criticized by Van Eekelen and Heinemann (1938) on account of the presence of substances other than vitamin C in the urine which reduce the dye and which are not removed by acidification. These substances—cysteine, ergothionine, and thiosulphate—amount to a daily total of approximately 3 to 6 mg. in the urine of a normal adult, whereas the total reducing substances, including vitamin C, amount to about 20 mg. on the average (Abbasy, Harris, Ray, and Marrack, 1935). Thus, reducing substances other than vitamin C may account for up to 30 per cent. of the reduction process in a normal subject; but following a test dose of ascorbic acid to which there is a marked response the proportion of these other substances to the total will fall to about 1 per cent. In subjects on a high protein diet and in sufferers from tuberculosis, peptic ulcer, or diabetes, the relation of vitamin C in the urine to the total reducing substances is very variable (Van Eekelen and Heinemann, 1938), but in other subjects the relation is fairly constant, vitamin C accounting for more than 60 per cent. of the reducing substances. The method may therefore be considered reliable enough for the routine testing of subjects other than sufferers from organic disease.

Conclusions from Experiment

The first experiment showed that the average concentration of vitamin C in the urine of a subject on a moderately high intake (approximately 70 mg. per day) was 1.76 mg. per 100 ml., and that the concentration in a given specimen bore little relation to its volume but a definite relation to previously eaten fruit. In specimens passed between four and eight hours after the test dose of ascorbic acid there was a great increase in the concentration. The maximum concentration of 27.7 mg. per 100 ml. was reached six hours after the test dose. In the twelve hours following the test dose 245.1 mg. of ascorbic acid was excreted—that is, 35 per cent. of the test dose.

It was thought likely, on the basis of the above data, that a subject whose diet contained moderate amounts of fresh fruit and vegetables would respond to a test dose of ascorbic acid by yielding a high concentration of vitamin C in a specimen of urine passed four to eight hours after a test dose. Further, if this overflow of ascorbic acid from the tissues into the urine occurred it might be presumed that the tissue requirements of vitamin C were being met. If, on the other hand, the administration of a massive dose of ascorbic acid produced no increase in concentration of vitamin C in the urine it would suggest that the tissues were depleted of vitamin C.

Tests in Two Groups of Boys

To verify this hypothesis a test dose of ascorbic acid was given to a group of sixty-two boys between the ages of 10 and 14 years, living in an institution for orphans and destitute children where the diet was known. During the year immediately preceding the experiment half of these boys had been receiving additional dietary supplements, including a daily orange, as part of the Carnegie United Kingdom dietary and nutritional survey. The diet of the supplemented group contained on the average approximately 63 mg. of vitamin C per head per day, while that of the group on the basic orphanage diet contained approximately 35 mg.

The estimates of vitamin C in the diets are derived from analyses of a detailed record of these diets for one week. This record refers to the gross quantities of uncooked food before it was supplied to the children. The actual quantities of vitamin C consumed by the children were probably somewhat less than the figures given.

In the experiment groups of six boys were tested at a time. They were instructed to pass their urine at 9.15 a.m. After they had micturated they were given a test dose of ascorbic acid (50 mg. per stone of body weight). They were told to pass their urine at the break (11.15 a.m.), and then not again until they returned at 1.15 p.m. They were also told not to drink more than a cupful of water before they returned. These precautions were taken to ensure that the 1.15 p.m. specimens would not be unduly diluted by pre-test-dose urine or by water drunk in the meantime. Estimations of the concentration of vitamin C in the 9.15 a.m. and 1.15 p.m. specimens were made. At the time of testing it was not known which boys belonged to the supplemented group and which to the unsupplemented. The estimations of the concentration of vitamin C in the post-test-dose urine, however, with one exception clearly differentiated the two groups (Table III and Chart 2). The exception, J. D., gave a result consistent with that of the supplemented boys, though he was on the basic orphanage diet. It was found later, however, that he had a special privilege which gave him access to unofficial dietary supplements.

TABLE III.—*The Response to a Test Dose of Ascorbic Acid of Boys on Low and Moderately High Intakes of Vitamin C*

Basic Diet				Supplemented Diet			
Boy	Concentration of 9.15 a.m. Specimen	Concentration of 1.15 p.m. Specimen	Vol. ml. 1.15 p.m. specimer	Boy	Concentration of 9.15 a.m. Specimen	Concentration of 1.15 p.m. Specimen	Vol.ml. 1.15 p.m. specimen
	mg. per 100 ml.	mg. per 100 ml.			mg. per 100 ml.	mg. per 100 ml.	
A. W.	1.2	1.1	—	A. Mc.	1.8	44.4	—
G. G.	2.3	1.5	—	M. Mc.	1.5	44.4	—
R. R.	1.1	1.3	200	A. Mc.	2.8	55.5	—
D. H.	0.7	0.9	340	A. M.	2.4	22.2	—
A. F.	1.1	0.7	135	W. R.	1.4	37.0	100
N. G.	0.9	0.7	70	E. M.	0.8	24.7	120
A. D.	0.7	1.9	30	A. Mc.	1.6	27.7	210
A. W.	1.4	0.7	400	G. V.	1.1	55.5	130
I. K.	0.8	0.7	100	J. C.	1.3	13.1	70
A. M.	1.0	1.3	265	J. S.	1.6	20.2	365
E. W.	1.2	0.8	30	W. G.	—	22.2	255
T. Mc.	0.7	0.5	200	J. W.	—	37.0	50
R. R.	1.3	0.7	30	J. L.	1.6	24.7	55
F. B.	0.7	1.0	195	D. D.	1.9	44.4	235
G. P.	1.0	0.8	240	W. J.	1.9	22.3	130
J. D.	(1.8)	(20.2)*	215	J. H.	1.5	14.8	500
N. T.	1.8	2.6	30	R. G.	0.8	44.4	40
H. R.	0.8	1.2	100	J. S.	1.0	44.4	120
P. F.	1.0	1.1	350	T. M.	1.6	27.7	160
O. D.	1.4	2.0 (3 p.m.)	90	D. W.	—	44.4	20
T. C.	1.2	2.1 (3 p.m.)	95	W. Mc.	2.4	44.4	30
R. G.	1.5	1.2	50	J. R.	1.8	17.1	270
R. Mc.	1.8	1.5	90	H. F.	1.3	20.2	160
C. B.	—	0.6	30	A. B.	—	19.8	50
R. S.	—	1.2	30	R. G.	0.7	55.5	130
S. G.	1.0	0.6	80	W. Mc.	—	74.0	30
D. S.	0.7	0.8	16	R. R.	—	15.8	140
C. S.	0.4	0.6	340	P. S.	—	22.2	80
T. G.	0.7	0.5	100	M. D.	3.2	44.4	80
A. R.	0.5	0.5	290	G. L.	2.1	37.0	110
J. T.	1.2	1.0	230	F. C.	—	31.7	30
Avge.	1.00	1.07			1.66	34.0	

* This boy was later found to have an unofficial source of dietary supplements.

The average concentration of the 1.15 p.m. specimens in the basic group, excluding J. D., was 1.07 mg. per 100 ml., with a range of from 0.5 to 2.6, and was not significantly different from that of the 9.15 a.m. specimens (1.00 mg. per 100 ml., with a range of 0.4 to 2.3). In the supplemented group the average concentration of the 1.15 p.m. specimens were 34.0 mg. per 100 ml., with a range of from 13.1 to 74.0; while in the 9.15 a.m. specimens the average was 1.66 mg. per 100 ml., with a range of 0.7 to 3.2.

Although the average concentration of vitamin C in the 9.15 a.m. specimens was slightly higher in the supplemented group than in the basic group the difference was clearly not sufficient to differentiate the two groups. The test dose of ascorbic acid, however, made the distinction

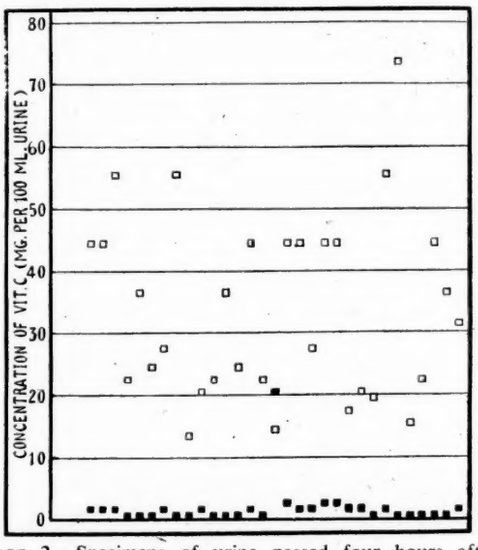

CHART 2.—Specimens of urine passed four hours after a test dose of ascorbic acid. □ = boys on high vitamin C intake. ■ = boys on low vitamin C intake.

clear. The table of results also shows that variations in the volume of the specimen passed four hours after the test dose do not affect the general validity of the test. The lowest concentration observed in the post-test-dose specimens of the supplemented group was five times as high as the highest concentration in the post-test-dose specimens of the basic group.

Vitamin C Storage

Further observations were made to determine the difference in regard to vitamin C storage in the supplemented and basic groups. Six of the boys in the latter group were given successive daily test doses. After three test doses (900 mg.) two had reached the "supplemented" level of response, and after four doses (1,200 mg.) three of the remaining four had reached this level. This indicates that if a child is on a low vitamin C intake a considerable amount of the vitamin would be required to bring it up to an optimal or near optimal level of response. An occasional extra allowance of fruit, even if continued for several days, would not produce a good response to the test.

Therefore, if a child responds to a test dose of ascorbic acid by yielding a marked increase in the concentration of vitamin C in the urine, it may be assumed that he has been on an adequate intake of vitamin C for a considerable time.

Discussion

The optimal daily requirement of vitamin C for children and adults is not known. Approximate minimum daily intakes below which signs of scurvy appear have, however, been determined. Göthlin (1931) found that in schizophrenics who had existed for some time on a diet devoid of vitamin C the capillaries were abnormally fragile and that it required an intake of orange juice equivalent to 21 to 30 mg. of ascorbic acid to restore the capillary fragility to normal. Recalculating these requirements and using additional data from animal experiments, Göthlin (1937) obtained values of 19 to 27 mg. for an individual weighing 60 kg. Abbasy and others (1935) suggest a daily intake of 25 mg. as the "minimal–optimum" requirement. This amount is also said to correspond to the ration of lemon juice that was required to prevent scurvy in sailors (Harris and others, 1936). Smith (1938), reviewing the literature on the human requirements of vitamin C, concludes that "values of 40 mg. for children may be considered the middle or barely adequate consumption level with but little margin of safety or allowance for individual variations in requirement."

Conclusions

The vitamin C intake of the boys in the basic group, which was estimated to be 35 mg. daily before cooking, approached the minimum physiological requirements as determined by Göthlin for adults. The intake of the boys in the supplemented group, estimated at 63 mg. daily, was above Smith's estimate of adequacy (40 mg. for children). The two groups may be considered to represent a low and an adequate level of consumption. It was found that the boys on the lower intake did not respond to a test dose of ascorbic acid. The boys on the higher intake, however, yielded a high concentration of vitamin C in the urine following a test dose of ascorbic acid. It may be presumed, therefore, that there was no marked lack of vitamin C in the tissues of the latter. Further, it may be concluded that a daily orange added to a diet containing approximately 35 mg. of vitamin C will in time produce a concentration in the tissues which is near saturation point. It is suggested that a child which responds to a test dose of ascorbic acid (50 mg. per stone of body weight) by yielding a marked increase in the concentration of vitamin C in the urine passed four hours after is receiving an adequate amount of vitamin C in its diet. If there is no response it may be inferred that the vitamin is being taken up to be stored and/or utilized, and that there is a lack of vitamin C in the tissues. Whether this degree of lack is harmful it is impossible at this stage to say. It is known, however, that in certain infective illnesses—for example, acute rheumatism, osteomyelitis, and tuberculosis—the utilization of vitamin C is increased (Abbasy, Harris, and others, 1936, 1937b, 1937c). Vitamin C is also believed to be necessary for the maturation of the erythrocyte (Witts, 1932). A child should not be considered adequately nourished, therefore, unless there is an abundance of vitamin C in the tissues, as judged by the overflow after a test dose of ascorbic acid.

Summary

Observations are recorded, before and after a test dose of ascorbic acid, on the variation in concentration of vitamin C in the urine of an adult male whose daily intake of vitamin C was approximately 73 mg.

A simplified test, based on the estimation of vitamin C in a single specimen of urine following a test dose of ascorbic acid, is described for assessing the past vitamin C intake.

The test clearly differentiated two groups of boys whose daily vitamin C intakes were approximately 35 mg. and 63 mg.

I am indebted to Sir John Boyd Orr, director of the Rowett Research Institute, Aberdeen, and to the trustees of the Carnegie United Kingdom Fund for permission to publish this paper. Roche Products Ltd. kindly provided the redoxon (ascorbic acid).

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EOSINOPHILIA IN TUBERCULOSIS

BY

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In none of the English textbooks of medicine in popular use is tuberculosis given as a cause of eosinophilia, and a review of the literature in the English language has not revealed any reference to the condition. Equally barren has been a search for a reference to eosinophil pleural effusions in tuberculosis. On the other hand, both eosinophilia and eosinophil pleural effusions in tuberculosis are widely recognized in Europe, and there are many references in French, Spanish, Italian, Danish, Russian, and German publications.

Eosinophilia in Tuberculosis

This condition is noted in foreign literature under the following headings:

After Tuberculin Injections, Whether Therapeutic or Diagnostic (Michailow, 1933; Tsinman, 1936; Korostysgevskaya, 1936; Umanskiy and Landa, 1938).—On the Continent this is known as the Michailow reaction.

Occurring as Part of the Syndrome of Tuberculous Lymphadenitis.—Here it may closely resemble Hodgkin's disease, making diagnosis difficult and biopsy necessary (Puech, Vidal, and Martin, 1932).

Complicating Artificial Pneumothorax Therapy.—Soglia (1932) considers the eosinophilia to be due to vagal stimulation as a result of the pleural puncture. Riera and Jacue (1933) state that it is of no diagnostic or prognostic significance.

Complicating Sanocrysin Treatment.—Riera and Jacue (1933) find that eosinophilia sometimes precedes the symptoms and signs of intolerance to the drug and may therefore prove of value in such cases. Thomsen (1937) also mentions eosinophilia as a forerunner of skin and mucous membrane reactions in tuberculous patients during treatment with sanocrysin.

Occurring Spontaneously in Pulmonary Tuberculosis.—Rugiero and Tanturi (1934), from a study of fifty cases, are of the opinion that an eosinophilia is of prognostic importance and that the disappearance of a previous eosinophilia is of grave significance. They consider that it is not a factor in the defence mechanism against the tubercle bacillus, but is an allergic phenomenon. They quote several authorities in support of this view, including Appelbaum, Claude, and Zaky; Richard; Bezançon, de Jong, and de Sorbonnes; and de Asna. On the other hand, Tagliabue and Bonizzi (1936) state that eosinophilia bears no relation to the general or local condition, but to "the tone of the neuro-vegetative system." These workers used Danielopolu's method of studying the neuro-vegetative system.

Eosinophil Pleural Effusions

The occurrence of these effusions in tuberculosis is recorded in a few instances.

Occurring Spontaneously.—Pratsicas and Antoniou (1933) describe the case of a man aged 50 suffering from Addison's disease, pulmonary tuberculosis, and an eosinophil pleural effusion. The case came to necropsy. Cristiani's (1932) patient was also a man, aged 58. The effusion was haemorrhagic, and a count of the fluid showed the unique figure of 84% eosinophils. Cappellini (1929) records a blood-stained tuberculous effusion in a young man aged 22, the effusion containing 22% eosinophils.

Complicating Artificial Pneumothorax Therapy.—Such cases are described by Gavazzeni (1935), Kabaker (1935), and Vaucher, Kabkaer, and Zenguinoff (1935). Pavie, Lefèvre, and Rossignol (1937) state that eosinophil effusions often complicate artificial pneumothorax, both in experimental animals and in humans.

The following case illustrates many of the features noted above.

Case Record

A youth aged 19 was admitted to hospital under my care on February 20 with a history of sudden onset of colicky upper abdominal pain some two months previously. These pains occurred several times a day and lasted only for a few minutes. One week previous to admission he had developed sharp pains in the right chest, together with a dry cough and marked sweating. There had been no serious illness in the past.

On examination there were fever and tachycardia and the patient looked ill. The respiratory system showed the physical signs of a right-sided pleural effusion, while the abdomen was distended and diffusely tender, and some ascites was present. A clinical diagnosis was made of abdominal tuberculosis and tuberculous pleural effusion.

Radiographs of the chest confirmed the presence of a right-sided pleural effusion but showed no localized pulmonary lesion, and the blood sedimentation rate was raised to 26 mm. at one hour. A specimen of fluid was withdrawn from the chest: this was turbid and slightly blood-stained, and a differential count showed the astounding figure of 80% of eosinophil polymorphonuclear leucocytes. No tubercle bacilli were found, and culture was sterile. A blood count showed a total of 9,200 leucocytes per c.mm., with 14% eosinophils. Further counts gave similar figures. These findings appeared to negative the original diagnosis, and further investigations were then made with a view to excluding the well-known causes of eosinophilia. Examination of faeces for worms and ova and of a blood film for parasites, the Casoni test, and the van Slyke urea-clearance test threw no further light on the aetiology of the condition.

The patient's general state steadily deteriorated: the fever was of a swinging sustained type, and the abdominal pains became worse and developed into those associated with a subacute intestinal obstruction. It was therefore considered justifiable to explore the abdomen, and on March 14 a laparotomy was performed by Mr. J. C. R. Hindenach. The intestines were found to be matted together and bound down by adhesions. Some fluid was present, and there were enlarged glands in the right iliac fossa. The general appearance was that of abdominal tuberculosis, and a small portion of peritoneum was removed for histological examination. The abdomen was then closed. The tissue removed was found to be tuberculous, thus upholding the original clinical diagnosis. The patient's general condition continued to deteriorate, and death ensued eleven weeks after admission. The last blood count showed the total white cells to have remained unchanged, while the eosinophils had fallen to 9%.

The post-mortem report was as follows: "Some adhesions at bases of both lungs. Flat tuberculous patches on the parietal pleura on both sides and on the parietal pericardium. No tuberculous pulmonary foci, but tubercles in the tracheobronchial glands. Intestines matted together. Serous coat studded with caseous tubercles. No tubercles found in liver, spleen, kidneys, pancreas, or suprarenals."

Commentary

The points to be noted are:

The doubt thrown on a clinical diagnosis by an unexpected laboratory finding, and the final vindication of the original diagnosis by biopsy and necropsy.

The high figure for eosinophils in the pleural fluid—approaching that recorded by Cristiani (1932).

The persistence of the blood eosinophilia in a patient whose general condition was steadily deteriorating (cf. Rugiero and Tanturi, 1934).

Summary

The literature of blood eosinophilia in tuberculosis and eosinophil tuberculous pleural effusions is reviewed and a case added.

I am indebted to Dr. Norah Schuster and to Dr. N. F. Maclagan respectively for the pathological and biochemical investigations.

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OSTEOMALACIA AND DENTAL CARIES

BY

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In the *Journal* of May 6, 1939 (p. 919), we published the results of the examination of the teeth of ten children with severe rickets, radiologically confirmed, in whom an average of 1.4 cavities per head was found. The ten children had ninety-six temporary teeth and 135 permanent teeth. This group was taken as a typical sample of children with severe rickets from the Kangra District of the Punjab. Diet and health surveys have been carried out in this district by the Public Health Department of the Punjab and also by Dr. Curjel Wilson. These two surveys show a high incidence of rickets and osteomalacia and definite vitamin D, calcium, and phosphorus deficiencies in the diets of most of the population there.

We concluded that the finding of almost perfect teeth in children with severe rickets demonstrates that diets deficient in calcium and phosphorus and the fat-soluble vitamins and rich in "anti-calcifying" cereals do not necessarily lead to a greater susceptibility to dental caries, and that other factors, including the physical nature of the diet, play a more important part.

Investigation of Twenty-two Osteomalacious Women

We have recently revisited the district and examined women with severe clinical osteomalacia. The results recorded in Table I show that in twenty-two cases of severe osteomalacia only thirty-four cavities were found in 565 teeth, or an average of 1.54 cavities per head. In eight of the twenty-two cases no dental caries whatsoever was observed. Hypoplasia was noted in seven of the women. Pyorrhoea alveolaris was present in half the number of women examined—in eight cases the disease was severe—which accounted for the majority of the teeth missing.

The osteomalacia was of a severe degree. Caesarean section had been done in five of the cases at the Canadian Mission Hospital, Palampur. In all of the cases severe pains in the back, pelvis, and thigh were or had been present, and in most of them the gait was typical of osteomalacia and the back was bent. Tetany was present or there was a history of tetany in eight cases. The women were all stunted, the average height being approximately 4 ft. 6 in. The majority gave a history of long and difficult deliveries. Many of them had had treatment for osteomalacia at the local Mission Hospital, at which cod-liver oil and calcium are given for that condition. The pains are usually relieved by the treatment in a few weeks or months, but these return when the women go back to their homes and their poor diet and when they again become pregnant.

These women come from a hill district and live in primitive conditions. The preliminary report of the diet survey of the district states that "the diet consists mainly of carbohydrates with relatively small proportions of protein and fat. Meat and vegetables are almost entirely absent." Very small quantities of poor-quality milk from deficient animals are occasionally consumed. Sugar is rarely eaten. Two meals only are taken daily, of rice and "chapatti" made of unmilled wheat ground to flour by the women themselves in their homes. They not only live on this poor diet but breast-feed their children for usually two to three years. There is no "purdah" system in the district, the women working in the fields in sunshine for most of the year.

The cause of the severe osteomalacia is thus the very poor diet, often associated with frequent pregnancies and long-continued breast-feeding.

TABLE I.—*Particulars of Twenty-two Osteomalacious Women*

Case No.	Age	Children		Osteomalacia				Teeth Present	Caries	Hypoplasia	Pyorrhoea
		Alive	Dead	Typical Gait	Bent Back	Pain in Back, Pelvis, and Thighs	Tetany				
1	20	1	2	Cannot walk	Yes	Severe	Yes	23	1	+	+ + +
2	25	2	–	Yes	,,	,,	No	27	1	—	—
3	22	2	1	,,	,,	,,	,,	24	2	—	—
4	45	2	–	,,	,,	Yes	History	21	1	+	+ + +
5	25	3	–	,,	,,	Severe	Yes	19	–	—	+ + +
6	35	4	2	,,	No	Yes	No	30	5	—	+ +
7	24	5	–	,,	Yes	,,	Yes	32	5	+ + +	+
8	20	2	1	,,	,,	,,	,,	28	4	+ + +	—
9	28	–	3	,,	,,	Severe	,,	25	1	—	+ + +
10	20	–	–	,,	No	Yes	No	28	1	—	—
11	22	1	2	,,	Yes	,,	,,	30	2	—	—
12	25	5	–	,,	,,	,,	Yes	30	1	—	—
13	40	–	2	,,	,,	,,	No	15	1	+	+ + +
14	32	5	6	,,	,,	,,	,,	20	–	+ + +	+ + +
15	33	3	–	,,	No	,,	,,	30	1	+	—
16	30	3	–	,,	,,	,,	Yes	15	8	—	+ + +
17	19	–	–	Cannot walk	,,	,,	No	28	–	—	—
18	30	5	4	No	,,	,,	,,	16	–	—	+ + +
19	25	–	–	Yes	,,	,,	,,	29	–	—	—
20	26	1	3	,,	,,	,,	,,	32	–	—	—
21	23	1	–	,,	Yes	,,	,,	31	–	—	—
22	22	1	–	Cannot walk	,,	,,	,,	32	–	—	—
						Totals		565	34		

Note.—In 565 teeth 34 cavities were found—an average of 1.54 cavities per head.

Their Children's Teeth

We also examined seven children born of these women; all of them had severe rickets. The results in Table II show that in 144 teeth of these rickety children only two cavities were present, confirming the results obtained in the group of children with rickets previously recorded.

TABLE II.—*Children with Severe Rickets Born of Women with Severe Osteomalacia*

Cases	Age	Clinical Rickets	Total Teeth Present	Cavities	Hypoplasia
1 (Child of osteomalacia case 1)	2 years	+	18	–	—
2 („ „ „ 11)	4 „	+ + +	20	–	—
3 („ „ „ 14)	2 „	+ + +	15	1	—
4 („ „ „ 18)	3 „	+ + +	20	–	+
5 („ „ „ 18)	9 „	+ + +	23	1	—
6 („ „ „ 18)	15 „	+ +	28	–	—
7 („ „ „ 22)	2½ „	+ + +	20	–	+ +
		Total	144	2	

Note.—In the 7 children only 2 cavities were present in a total of 144 teeth.

One of us (C. D. M. D.) has been studying dental fluorosis in the Punjab in recent years. In the plains of this province dental fluorosis is very common; in some districts all children have mottled enamel. It has been recently suggested in America that mild degrees of fluorosis prevent dental caries. In the Kangra District of the Punjab dental fluorosis is conspicuous by its absence. An occasional child in whom we saw it there, among the many hundreds examined, had come from another district and had not been brought up in Kangra. Fluorine intoxication need not therefore be considered as a possible immunizing factor.

Conclusions

The above results in these twenty-two women, who appear to be typical of many thousands in this district, show that the teeth may be nearly perfect although severe decalcification of the bones has occurred as the result of osteomalacia. It is a common assumption, at the present time, that during pregnancy women's teeth show a greater susceptibility to dental caries; and much money is spent on calcium and vitamin treatment in Western countries as a protective measure. In the light of our findings we consider, therefore, that the question of the association of dental caries with pregnancy needs more careful study.

We also conclude that as we found nearly perfect teeth in children and women with severe rickets and osteomalacia the calcification and decalcification of the bones of the body are not necessarily directly connected with the same processes in the teeth.

At a later date it is hoped that biochemical work on these cases of severe calcium deficiencies will be done in the Kangra District.

Suzanne Rossier (*Thèse de Paris*, 1940, No. 214), who records a fatal case in a woman aged 45 (the diagnosis was confirmed by a virulence test), states that diphtheritic septicaemia presents a characteristic clinical picture. The blood culture is positive, while cardiac signs are inconstant, but an acute malignant endocarditis is always found post mortem. The issue is always fatal. Diphtheritic septicaemia is the consequence of a previous bacteriaemia, which would probably be found to be less rare than is supposed if minute and systematic investigations were made such as examination of the blood and urine during life and of the organs after death. The pathogenesis is still obscure, as an anatomical study does not show under what conditions the diphtheria bacillus, which is usually confined to the initial lesion, can pass into the blood. Possibly the necrotic ulcerative character of malignant diphtheria favours this passage, or a special virulent form of the organism may be responsible.

ETHER CONVULSIONS

BY

HAMILTON BAILEY, F.R.C.S.
Surgeon, Royal Northern Hospital

Although I have been observing anaesthesia by ether almost daily for twenty-five years it was not until seven months ago that I saw a case of serious ether convulsions. I happened to go into the theatre; an operation for acute appendicitis upon a girl of 13 had just been completed and artificial respiration was in progress. The patient was having convulsions of the most violent character; at the height of the spasm the lower limbs literally banged upon the table. These fits, I learned, had been going on with increasing severity for a quarter of an hour. It was not long before the cardiac centre failed, and in spite of the combined efforts of the anaesthetist and surgeon resuscitation was ineffectual.

These ether convulsions reminded me exactly of a case of novocain poisoning which had been engraved indelibly upon my memory. Convulsion followed convulsion until the respiratory centre failed, but the pulse remained good. CO_2 and oxygen was administered, but the convulsions continued. The cardiac centre then gave out. I performed cardiac massage and the heart restarted, and three hours later the patient's condition was tolerably satisfactory. Approximately three hours later still, during the night, the convulsions restarted and proved fatal.

My interest in anaesthetic convulsions having been awakened, I consulted the literature. I could find no satisfying explanation of the phenomenon. It appeared that most cases of ether convulsions have occurred during the hot weather. (The case of ether convulsions I had observed occurred on a cold winter night.) The treatment recommended was to keep the lungs inflated. Ten c.cm. of a 10 per cent. solution of calcium gluconate intravenously had been advised, and in several instances the intravenous injection of evipan had put a stop to the convulsions. Momentary compression of the common carotid arteries had also been put forward as a suggested method of treatment. In discussing the subject with colleagues I learned that one had seen a successful issue from douching the patient with ice-cold water.

Recent Cases

Case 1.—Six weeks later, during the exceptionally cold weather of January, 1940, I had just removed an early acutely inflamed appendix from a stout but athletic man of 30. Ether convulsions started. First of all there were twitchings of the muscles of the face, and later spasms of the abdominal muscles, making closure of the incision difficult. So great were the spasms that the sutured internal oblique tore out and the peritoneum was pulled asunder. My attention was directed mainly to closing the abdomen, but I suggested to the anaesthetist calcium gluconate. There was none in the theatre. I then suggested evipan, and this was got ready. By this time, in spite of difficulty, I had succeeded in closing the abdomen. The spasms continued with increasing severity; the legs banged upon the table just as in the case I have described above. The respiratory centre then failed, and artificial respiration was begun. The anaesthetist advised against giving the evipan which had been prepared, saying the patient was already deeply anaesthetized. We persevered with artificial respiration and the pulse remained good. Ten minutes later the heart failed. I carried out intracardiac injection of adrenaline and later performed cardiac massage, but without avail.

The bottle of ether was sealed and sent to Messrs. Duncan, Flockhart for analysis. It had been purchased recently and kept in the dark. Messrs. Duncan, Flockhart had the contents analysed and it was

found in perfect condition. Their representative told me that they had kept a record of all cases of ether convulsions brought to their notice. Most of these had occurred in the hot weather and the patients were often obese. They could offer no specific instructions for treatment. I also discussed the case with several professional anaesthetists, who were in agreement that evipan should not be administered to a patient who was already deeply anaesthetized.

Two weeks ago I saw two further cases of ether convulsions.

Case 2.—This patient was a woman of 40, with gallstones, on whom cholecystectomy was being performed. The convulsions were just beginning, and at this early stage a capsule of calcium gluconate was administered intravenously forthwith. After three minutes no further twitchings occurred.

Case 3.—The next day, to my dismay, while operating upon a case of stone impacted in the common bile duct, ether convulsions started. Calcium gluconate was given at once, this time without effect. Convulsion followed convulsion in the sequence I have described. This patient, unlike the others, was a man in extremely poor condition, and I knew too well that unless a powerful antidote was forthcoming immediately the case would certainly end fatally. I remember thinking that the patient was deeply anaesthetized and, further, that evipan is especially contraindicated where the liver function is depressed. Even so, I insisted on the administration of evipan. The fits by now had reached alarming proportions, and when 3.5 c.cm. of evipan had been injected a fit was at its height; the patient gave a long inspiration—almost a yawn—and from that second the fit ceased, and no more followed. I completed the operation while the anaesthetist administered CO_2 and oxygen. The pulse was steady but the volume poor. As soon as the CO_2 and oxygen was discontinued respirations became feeble. They were not exactly of the Cheyne-Stokes variety, but rather a series of weak inspirations followed by a feeble sigh, during which the lower jaw twitched. After waiting a quarter of an hour there was no substantial improvement. I therefore suggested an injection of lobeline. Within five minutes there was some improvement, and a second injection was given with a remarkable increase in respiratory ventilation. The patient recovered.

Commentary

No doubt exists in my mind, or in the minds of those who were present with me in the theatre, that *the* treatment for ether convulsions is the early administration of even a small dose of evipan.

So universal is the opinion that ether convulsions are in some way connected with hot weather that it would be impudent for me to suggest that this theory is but idle conjecture. Yet, seeing that two cases occurred during the coldest weather within living memory, my experience is diametrically opposed to this theory. I therefore put forward a suggestion. Overheating it may be, but this overheating is due neither to the outside temperature nor to the temperature in the theatre, but it might be due to the temperature of the water which heats the ether in the modern anaesthetic apparatus. Are anaesthetists in agreement as to the temperature at which the water which surrounds the ether bottle should be kept? I have not noticed that this is regulated by a thermometer.

A. NANSOT (*Thèse de Paris*, 1940, No. 312), who records five cases in men aged from 44 to 56, states that the complications of lumbar puncture may be classified in four groups according as they are due to hypotension, hypertension, inflammatory reaction of the meninges, and shock. Fatal cases seem to be due to the last cause and generally occur in subjects with arterial hypertension, in whom there is a sudden vasodilatation with a perivascular exudation. Prophylaxis consists in a gradual reduction of the spinal decompression and a limitation of the amount of fluid withdrawn.

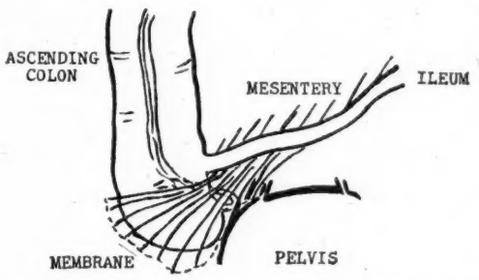
Clinical Memoranda

An Unusual Ileo-caecal Membrane

The discovery of peritoneal membranes complicating the usual anatomy of the ileo-caecal region is not uncommon during appendicectomy. In the case described a membrane not previously reported was found.

CASE RECORD

A boy of 14 had suffered from five attacks of subacute appendicitis during the preceding two years. In a quiescent interval the abdomen was opened by a gridiron incision, when considerable difficulty was found in delivering or even visualizing the appendix. It was soon clear that a semi-transparent membrane covered the caecum. At first this was thought to be an example of Jackson's membrane, but its attachments and the direction of its fibres were quite different. Proximally it originated from the antimesenteric border of the terminal six inches of ileum, forming a broad sheet the fibres of which ran downward and outward in front of the caecum and appendix, blending with the posterior parietal peritoneum lateral to and below the caecum and attached to the pelvic brim medially (see illustration). A cul-de-sac



was thus formed into which the caecum descended more deeply with each inspiration. No other anomaly was found; the caecum was completely peritonized, the appendix was retrocaecal and singularly free of adhesions, and a Meckel's diverticulum was not present. The membrane was well supplied with long parallel vessels, and on division was seen to consist of two serous layers separated by a thin plane of areolar tissue.

DISCUSSION

A number of different types of band or membrane may be found in this region. Excluding those associated with a Meckel's diverticulum, there are, first, those which are anatomically normal—the meso-appendix, the ileo-caecal fold, and probably also the ileo-colic fold. Secondly, there is a structure which, though anatomically normal, can only appear with a certain type of caecum. The retroperitoneal caecum is fixed and the wholly peritonized type quite free; but when the degree of peritonization just falls short of the latter the caecal fold is produced, running laterally from the posterior aspect of the caecum and bounding the caecal fossa. Thirdly, it is probably more common than not to find short fibrous adventitious bands connecting two or three members of the caecum–appendix–ileum triad, and these mostly run on the front of the organs concerned. Fourthly come the adhesions of inflammatory origin, not difficult to recognize, associated with other evidence of past inflammation, irregularly vascularized, and commoner towards the appendix tip.

Finally, there are the definite membranes of which I have described an example—wide structures, well vascularized with leashes of long parallel vessels, and usually independent of the appendix itself. Of these, two are common enough to have been named. Jackson's membrane is a broad filmy sheet attached to the posterior peritoneum lateral to the ascending colon sweeping downward and in over the caecum towards the pelvic brim; some authors describe it as also having a superior origin from the greater omentum. Lane's band is short and thick, connecting the antimesenteric border of about two inches of terminal ileum to the pelvic brim. The one I describe should be classed with these as a well-

defined structure, almost certainly congenital, about the developmental origin of which no final conclusion can be reached. It is natural to ascribe these membranes to irregularities in the process of mid-gut rotation, when the young caecum falls to the right and the ascending mesocolon fuses with the posterior parietal peritoneum. At this stage the ileo-caecal region is a centre of diverse activities, part of the mid-gut remaining free and "mesenteried" as ileum, part being fixed and retroperitoneal as ascending colon; the caecum has a range of variation between either extreme. There is, however, no evidence to associate these membranes with such signs of partial arrest as high caecum or ascending mesocolon; and any attempt to relate the ileal bands to variants in which the fusion process passes to the left of the ileo-caecal valve must account for their common association with a free caecum and the extreme rarity of a fixed terminal ileum. The presence or absence of a Meckel's diverticulum does not appear significant, and there is never any embryological ventral mesentery in this region to account for the antimesenteric attachment of the ileal bands. There would appear to be scope for detailed embryological research on the origin of the varied added structures in the ileo-caecal angle.

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Sector 1, E.M.S.

Diaphysial Aclasia with Spinal Complication

The following case seems to be interesting enough to be placed on record.

CASE HISTORY

The patient, a messenger boy aged 17, had been under observation for diaphysial aclasia since the age of 7. At 14 some bony prominences were chiselled off the left internal malleolus to enable him to walk with shoes. He was always very sensitive about the prominent, nobbly, and ungainly appearance of his knees, ankles, and elbows. His employer, a chemist, had noticed that he was awkward in his movements and easily tripped up. In January, 1937, while dismounting from a bicycle he fell, and sought medical attention.

On examination there were well-marked signs of an upper neurone lesion of the spinal cord: spasticity, increased reflexes at the knees and ankles, and clonus of patellae and ankles. All the symptoms were more pronounced on the left side. These symptoms rapidly became worse, and in a few days a band of hyperaesthesia appeared on both sides of the trunk at the level of the sixth dorsal nerve root. Three days after being admitted to hospital the spastic paralysis of the left thigh and leg had become complete.

X-ray examinations were carried out on the spine, and the offending exostosis was revealed growing from the posterior aspect of the sixth dorsal vertebral body, towards its left side. The spine was further affected by an exostosis growing from the transverse process of the first lumbar vertebra on the right side. The first piece of the sacrum showed spina bifida. In the upper dorsal region there was a right subscapular exostosis; it simulated a spinal growth when seen laterally, but the antero-posterior view revealed its true origin. Other exostoses grew from the upper and lower ends of both tibiae, femora, radii, ulnae, humeri, and the right scapula.

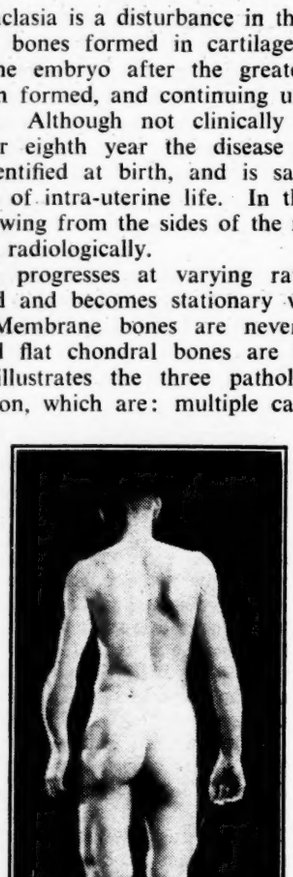
On February 2, 1937, laminectomy was carried out, centring on the sixth dorsal vertebra. When the neural arch was laid open a cancellous exostosis capped with cartilage, 1¼ inches by ½ inch in the middle portion, was seen, almost filling the vertebral canal. The cord was pushed across to the right side, and appeared to be acutely nipped by the growth. Without opening the dura, and with the cord protected by retractors, the soft cancellous exostosis was gouged out with a hand chisel below the level of the rest of the centrum.

A certain amount of spinal shock followed the operation, and sphincteric control was lost for five or six days. This passed off, and in three weeks both lower limbs could be moved stiffly. Re-education was given, and in three months the patient was able to leave hospital with crutches. These were discarded within a few months, and later he was able to work on a farm. A slight stiffness in some movements of the lower limbs is all that remains of the spastic diplegia.

COMMENTS

Diaphysial aclasia is a disturbance in the endochondral ossification of bones formed in cartilage, making itself manifest in the embryo after the greater part of the bones has been formed, and continuing until growth has been arrested. Although not clinically manifest until the seventh or eighth year the disease can be radiographically identified at birth, and is said to begin in the latter part of intra-uterine life. In the infant small bony buds growing from the sides of the metaphyses can be recognized radiologically.

The disease progresses at varying rates during the growing period and becomes stationary when adult life is reached. Membrane bones are never affected, but both long and flat chondral bones are involved. The present case illustrates the three pathological features of this condition, which are: multiple cartilaginous and bony outgrowths; failure of bone modelling; and irregular retardation in longitudinal growth. The essential feature is the failure of bone modelling that occurs at the metaphysis, a modelling essential for the new bone to form part of the shaft. The unmodelled bone shows scanty and irregular Haversian systems, and is often mixed with masses of unaltered cartilage. As a result of this uncontrolled and irregular growth the ends of the bones become widened, with thinning of the cortex and the occurrence of numerous irregular outgrowths or exostoses. The case reported is also unusual in presenting spinal complications.



Photograph taken in 1938 showing winging of right scapula (subscapular exostosis), curvature of the left forearm, and valgus at right ankle. The right leg is shorter than the left, the pelvic tilt being shown by inclination of natal cleft and lordosis.

H. KENRICK CHRISTIE, F.R.C.S.
Wanganui, N.Z. B. T. HOOPER, D.M.R.E.

Dr. Ernest L. Stebbins, assistant commissioner for preventable diseases in the New York State Department of Health, has been appointed professor of epidemiology at the College of Physicians and Surgeons, Columbia University.

Reviews

BORDERLANDS OF DYSPEPSIA

Aux Confins de la Dyspepsie. By Maurice Loeper. (Pp. 308; 33 figures. $1.85.) Paris: Masson et Cie. 1940.

It has been declared that the stomach is more often sinned against than sinning. Certainly it is frequently ill served by the body which it serves so well. This may be taken as the text of Prof. Maurice Loeper's book dealing with the borderlands of dyspepsia. As he points out, "dyspepsia" is a vague term, and the condition is seldom limited to the stomach. Unless it is taxed by unsuitable food, excess of alcohol, or sepsis from the mouth and upper respiratory tract, the stomach does not often go wrong of itself; it is alleged, for instance, that new growth does not develop in a previously healthy stomach. On the other hand, it reflects very quickly as in a mirror the disturbances which are going on elsewhere, whether in mind or body. These secondary disturbances are, in Prof. Loeper's experience, decidedly commoner than dyspepsia due to local gastric conditions, and it is to a consideration of these disturbances that he devotes this book.

To maintain the harmonious working of the stomach there must be the interweaving of numerous factors. It depends, for instance, on the general and portal circulations (for portal stasis is responsible for various gastric troubles), on the composition of the blood, on the endocrine balance, and on the state of the autonomic nervous system. Thus the vagus may excite hyperchlorhydria and hypertonia, while hypochlorhydria and atony of the gastric musculature may result from sympathetic stimulation. Indeed, the condition, described by Fiessinger, of gastric atony combined with spasm of the pyloric sphincter is generally recognized in this country as due to emotional stimulation of the sympathetic, which supplies both inhibitory fibres to the body of the stomach and motor fibres to its outlet. Even the position of the stomach participates in this equilibrium, as shown by the influence of atony of the diaphragm, tension in the colon, the volume of the spleen, and the enlargement or shrinkage of the liver. When to this is added the effect of circulating toxins, as in uraemia or infections, the list of factors is indeed an imposing one. Each of these is carefully considered in turn, and while it is not possible to deal here with each in detail, we may refer to a few points of special interest. In considering the dyspepsia associated with pituitary diseases, emphasis is laid on the occurrence of anorexia and hypotonicity. The resemblance between anorexia nervosa and Simmonds's disease is stressed, and the following case illustrates the malpraxis which may result from failure to distinguish between organic lesions and functional states. A girl of 20 after an emotional shock developed amenorrhoea and anorexia. Radiography having demonstrated a sluggishly emptying gall-bladder, a surgeon removed it without benefit. Nothing daunted, he later removed the appendix and finally performed a gastropexy, all naturally without benefit. A sojourn in a nursing home and administration of pituitary and ovarian extracts were followed by a cure. We would suggest that separation from her family which the nursing home entailed, together with a strict regimen, probably played a larger part in her recovery than the endocrine therapy. The chapter entitled "The Four Dyspeptic Reactions of Diabetics" is worth careful perusal. The four referred to are: (1) simple flatulent dyspepsia characterized by hyposecretion and gastric atony—this the author correlates with hyperglycaemia, though that appears somewhat doubtful; (2) "accidental" painful dyspepsia which is prodromal of coma, a very important symptom the significance of which is too often missed; (3) hypersecretion and increased motility with marked pyrosis and some pain, which may follow the injection of insulin until the patient has become gradually accustomed to its use—this is a new observation to us; (4) persistent painful dyspepsia, which points to pancreatitis, whether associated with a calculus or not.

This book is based on a series of lectures delivered in the medical clinic of St. Antoine. Those who know Prof. Loeper for the cultivated physician that he is will expect it to be illuminating and practical, and they will not be disappointed.

STREET CASUALTY SERVICES

Casualty. The Training, Organisation and Administration of Civil Defence Casualty Services. By G. B. Shirlaw, L.R.C.P., L.R.C.S.Ed., L.R.F.P. & S.Glasg. Foreword by Oliver Simonds, M.P., and Introduction by Clement Francis, M.A., M.B., B.Ch. (Pp. 283; with 70 diagrams and illustrations. 8s. 6d. net.) London: Secker and Warburg. 1940.

In any casualty service the two factors which govern efficiency are accuracy of classification and speed of clearance. Obviously it is upon the classifying machinery that clearance—which in the last analysis means evacuation—depends for its smoothness and for its utility. Wartime medical services have to run on conveyor-belt lines. If at any point on the chain from actual wounding to convalescence a patient is wrongly diagnosed, not only are his own chances lessened but material, surgical skill, and ambulance transport are diverted from other cases to which they might more properly be assigned. Heavy responsibility, therefore, is placed upon those who make the initial classification of an injured person, for in doing so they probably decide the patient's future, not merely for the next few hours but for the rest of his mortal span.

Dr. Shirlaw has set out to produce a book covering every aspect of the training and actual work of the street casualty services. He does not attempt to pursue his inquiries beyond the hospital door, since, as may be said without undue cynicism, by that time the patient is either safe or beyond recall. The book falls into three sections, the first dealing with the surgical principles of first aid and to a certain extent with technique. Then there is a compendious account of the Government scheme—most valuable to administrator or M.O.H., and the only thing of its kind in existence. Finally—and this is obviously the *raison d'être* of the book—there is a section criticizing existing casualty arrangements and giving in considerable detail proposals which are of a most basic nature.

There are two approaches to the designing of a casualty service: the surgical or scientific, and that of the administrator, which is necessarily bounded by considerations of expense. Actually they should not be considered as separate approaches but rather as components of an equilibrium which we may name maximum efficiency—in this case efficiency viewed from the somewhat personal point of view of the patient desiring to recover. Now Dr. Shirlaw obviously feels that in the design of the existing scheme surgical considerations have been relegated too far to the background. He points out with complete accuracy that the initial classification of air raid casualties, which is performed by stretcher parties and which in each case is a major surgical diagnosis, is in the hands of men individually worthy but quite unsuited to their task. These "first-aiders" are largely manual labourers who have received a course of training based on a textbook designed to meet the exigencies of the overcrowded theatre pit and of a summer Sunday afternoon in Hyde Park. They have no deep appreciation of

war injuries and yet are called upon to decide whether a man shall walk home, go to an aid post, or be taken to hospital. The short point of Dr. Shirlaw's argument is that surgical control over the casualty should be exerted from the beginning of the case-history and not at its end; in other words, that the surgical future of the patient shall be decided scientifically. To this end the author describes a unit, "The Classification and Evacuation Post," where diagnosis can be precise and where *real* life-and-death emergency surgery may be attempted.

The whole of this book benefits from Dr. Shirlaw's experience in the medical service of the Spanish Republic and from his present experience as medical officer under a metropolitan borough council. Any deficiencies in style may be forgiven in the light of the stimulating contents; and even though much that is stated may seem less self-evident to the reader than Dr. Shirlaw imagines, *Casualty* is a valuable contribution to the literature of this war.

DISEASES OF THE OESOPHAGUS

The Diagnosis and Treatment of Diseases of the Esophagus. By Porter P. Vinson, B.S., M.A., M.D., D.Sc., F.A.C.P. (Pp. 224; 98 illustrations. 22s.; $4.00 post paid.) Springfield and Baltimore: Charles C. Thomas; London: Baillière, Tindall and Cox.

Ideas and suggestions concerning the oesophagus are always welcome, for from the standpoint of both pathology and medicine, not to mention surgery, it is one of the most elusive and unmanageable organs in the body. A monograph by so well established an authority as Dr. Porter Vinson should therefore receive attention from a wide circle of readers, who will not be disappointed. It is rather curious that Dr. Vinson, who must be well acquainted with the literature of his subject, should suppose that no other monograph has been written on the "diagnosis and treatment of diseases of the oesophagus," but it may be conceded to him that no other covers the ground in quite the same way.

The book is written rather from the point of view of the physician and the practitioner than from that of the endoscopist or the surgeon, and Dr. Vinson lays great emphasis on the relation of disease in the oesophagus to general medicine. He gives a sufficient account, though not in great detail, of endoscopic examination for purposes of diagnosis and the removal of foreign bodies, but he makes no attempt to describe the hazardous surgical attacks on the oesophagus which have been periodically fashionable in the last two or three decades. He advises against endoscopy as an essential part of routine examination, and points out that all the required information can often be gained without subjecting the patient to the unnecessary discomfort and risk. As he has reached this conclusion from the experience provided by some three thousand cases of oesophageal abnormality this opinion must carry great weight, and the hope may be expressed that it will save some patients from useless explorations with the oesophagoscope. Dr. Vinson attaches great importance to swallowing a silk thread which may be used as a guide for passing sounds and bougies. This method is not much used in Great Britain, and there is no doubt that it could be employed with advantage more frequently, for the author shows in what a variety of conditions it can afford help.

In 1912 H. S. Plummer, whose portrait forms the frontispiece to the book, drew attention to the condition which is generally called the Plummer-Vinson syndrome, though it was first fully described in 1919 by Adam Brown Kelly and Donald R. Paterson. Vinson later described such cases in 1922 under the title of "hysterical dysphagia." It seems strange that he should still retain this nomenclature for a malady associated with such gross organic changes, but he believes that the dysphagia which forms such a prominent feature of the syndrome is purely functional, nor does he accept the opinion, which on well-founded evidence is steadily gaining ground, that the condition predisposes to cancer.

The author has avoided that tedious if conscientious method of writing in which numerous authorities are quoted, and tells his tale in plain language, which makes the book delightful reading. His publishers have served him well and produced it in an exceptionally pleasant and appropriate form.

REASSURANCE AND RELAXATION

Reassurance and Relaxation. A Short Textbook of Practical Psycho-Therapy Describing the Nature of Anxiety and how to Induce Relaxation in the Nervous Patient. By T. S. Rippon, M.R.C.S., L.R.C.P., Wing Commander, R.A.F. (ret.), and Peter Fletcher. With an introduction by W. Russell Brain, M.D., F.R.C.P. (Pp. 222. 6s. net.) London: George Routledge and Sons, Ltd.

In some ways the title of this book is misleading, for to those who go no further than the title it may appear that it should be dismissed as treatment by an expectorant mixture where no attempt is made to diagnose the cause and the nature of the cough is dismissed. Yet the fact remains that expectorants help many coughing patients to recover. This book, however, is much more than a stock expectorant mixture, and if the authors teach a technique whereby the patient learns to relax and describe how he may be reassured, so much the better, for they insist that both physician and patient must have insight into the nature and causes of the symptoms—in other words, a true diagnosis must be made. In a final chapter the need for faith in the worthwhileness of life is stressed, which is the true essence of religion. Like many modern psychotherapists, the authors believe that not only is prolonged and deep analysis unnecessary and even harmful in the majority of cases, though a few do require it, but that knowledge, however deep and full, is not enough. The patient must be led to feel in tune with life, and for this reassurance and reconstruction are necessary to give him in his own eyes a place in an adequate constructive philosophy of life.

A clearly written and sensible little book, our only criticism being that there are so many others like it.

THE INFECTIOUS FEVERS

Acute Infectious Diseases. A Handbook for Practitioners and Students. By J. D. Rolleston, M.A., M.D., F.R.C.P., F.S.A., and G. W. Ronaldson, M.D., D.P.H. Third edition; revised and enlarged. (Pp. 477. 17s. 6d. net.) London: William Heinemann (Medical Books) Ltd. 1940.

The third edition of J. D. Rolleston's well-known and scholarly textbook will be widely welcomed. While the distinctive characteristics of the book have been retained, its value has been greatly enhanced for the reader in active practice by inclusion of full accounts of modern technique in diagnosis, treatment, and hospital management of the common infectious diseases. The scope of the work is limited to that of which the authors have long personal experience, and herein lies its value. It does not stray into realms which rarely, if ever, come within the purview of the fever hospital physician in this country. There are but eighteen chapters: seventeen on individual diseases, and a valuable new one on isolation methods. Every chapter is a mine of information, revealing an encyclopaedic knowledge of the literature of the subject in many languages. Starting with a delightful account of the history of each disease Dr. Rolleston proceeds from his own intimate knowledge to dovetail it in with modern

developments extending from the beginning of the present century. He relies for his effects on the artistry of writing, and is disdainful of illustrations, the sole examples of which are some plans of isolation wards in the last chapter.

While there is little to criticize in the new matter added in this edition, one feels that there might have been a more vigorous pruning here and there of outmoded material. In these days a long description of intramuscular injection is not required, and the three and a half pages devoted to serum disease have little but historical interest since the introduction of the "digest" method of serum concentration. Similarly, the chapter on cerebrospinal fever is not sufficiently modified by the new factor of chemotherapy. The description is almost entirely that of the serum-treated disease. The best chapters are those on diphtheria, scarlet fever, typhoid fever, typhus fever, small-pox, and measles, all of which are fascinating, complete, and bear the stamp of the master. This is a book for the practitioner, the consulting physician, and the fever hospital medical officer who wish to bring their knowledge of the subject up to date and to possess a valuable work of reference.

Notes on Books

Clinical Toxicology, by Professor CLINTON H. THIENES of the University of Southern California, is a small manual in which the subject is treated from a clinical rather than from a medico-legal aspect. About three-quarters of the text is concerned with the effects produced by poisons and one-quarter with the chemical diagnosis of poisoning. The substances discussed include not only drugs used for clinical purposes but also industrial poisons. The number of chemicals discussed is therefore large, and the volume will be found a very convenient work of reference. In particular, accounts are given of certain exceptional causes of poisoning, such as fluorine, triorthocresyl phosphate, dinitrophenol, selenium, etc. Inspection of the volume shows that the author has been at great pains to collect the most accurate data available relating to problems such as the probable lethal doses of the better-known poisons. It is published by Henry Kimpton at 18s.

Nurses, medical auxiliaries, and all who have to perform similar duties need a background of medical knowledge, but almost necessarily find the ordinary medical textbook too unwieldy to be of any use to them. Their need is for a single volume which will give them, in a concise form and on good authority, all the information they need. *Groves and Brickdale's Textbook for Nurses* was first published in 1912 with the idea of supplementing hospital lectures and forming a basis for examinations, of summarizing the medical student's books and amplifying the nursing manuals. It adheres closely to broad principles and avoids unduly multiplying technical terms. The war, with its demand for many thousands of new nurses, makes such a textbook even more necessary than ever, and the sixth edition of this work will undoubtedly find many new readers. Its valuable appendices include a special table giving the properties and first-aid treatment of poison gases used in war. The section on the physiology of the brain and nervous system has been entirely rewritten. The publishers are the Oxford University Press, and the price is 21s.

The issue of an eighth edition (Baillière, 16s.) of the *Manual of Diseases of the Eye*, long known as "May and Worth," is ample testimony to the value of the book and of the excellent work done by Mr. MONTAGUE L. HINE in his continued revision of the text. He has introduced a new chapter on injuries especially liable to occur in wartime. The book was originally designed for the student of medicine and the general practitioner. This design has been maintained. It is a most excellent and thoroughly clear guide to the student, and full enough to be of continued use to the practitioner. One of its good points is the fullness of the illustrations. Every condition that can be pictured is pictured, every necessary instrument is figured, while the coloured drawings of surface and fundus diseases are so good that an additional atlas is not needed.

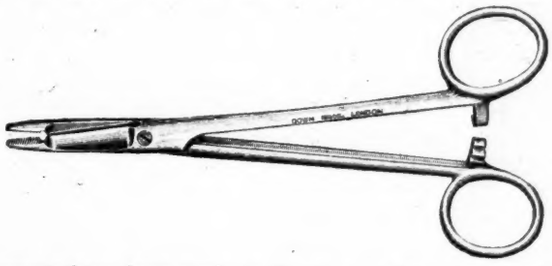
The Nursery School Association of Great Britain, 8, Endsleigh Gardens, W.C.1, has been fortunate in securing the services of Miss MARGERY ABRAHAMS, dietitian to St. Bartholomew's Hospital, as author of an excellent little sixpenny book called *Nursery School Diet*. The theoretical and practical implications of modern institutional work are well interpreted, and although the menus are perhaps more particularly suitable for the child of the toddler age, there is much in this book which is of value to those concerned with the diet of children of all ages. The present forty-page booklet is apparently a new and revised edition, and it can be heartily commended to all those who have now perhaps for the first time to study the scientific and economic aspects of feeding a family.

Preparations and Appliances

COMBINED NEEDLE HOLDER AND SUTURE CUTTER

Dr. BRYAN WILLIAMS, F.R.C.S.Ed., M.R.C.O.G., writes:

An instrument that will act as both needle holder and suture cutter saves time and trouble. Such an instrument is of value not only when one is working single-handed, as in repair of an episiotomy after delivery, but also when one is working with assistance, as in prolapse operations, when many sutures have to be inserted and cut. Several such instruments have been made in the past, and one was used by Sir William Macewen about 1895. Those described by Gillies and McCullagh I have found to be useful. The one illustrated here has been made for me by Messrs. Down Brothers. It has been modelled on the Mayo-Hegar type of needle holder, and will be found convenient by those who are used to this type of instrument.



NEW PORTABLE X-RAY APPARATUS

A portable *x*-ray apparatus, designed with the fracture clinic and cottage hospital especially in view, has been placed on the market by Watson and Sons (Electro-Medical), Ltd., whose temporary address is 76, Castle Street, Reading. It is described as Type MX–1, and the special claim of dependability is made for it, a quality not always easy to ensure in portable installations. Dependability is secured in this case by a generous allowance for electrical stress and by a special process whereby the shock-proof tube head is filled with insulating oil under vacuum, rendering it immune to atmospheric conditions. In the tube itself the anode extension has been treated by a new process which prevents the transferred heat from adversely affecting the insulating properties of the oil, and thus the thermal capacity can be increased, which in practice means that screening can be carried out for far longer periods than was considered possible before. In addition to the tube head the apparatus comprises a separate control unit and a hand time-switch, for use in conjunction with a demountable mobile or stationary stand. It operates on any alternating supply between 95 and 240 volts, 50–60 cycles. It is stated that among the first series of this apparatus supplied for service no failure has been reported, and that in the laboratory the equivalent of 60,000 exposures has been made without deterioration.

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CROSS-IMMUNITY BETWEEN VARIOLA, VACCINIA, AND ALASTRIM

That vaccinia gives protection against variola is an established fact; it is the basis of our method of small-pox prophylaxis; and, as this is so, these two viruses must at least be closely alike in antigenic constitution. Despite this similarity, however, the two viruses differ essentially in their infectivity for different animal species, and it seems probable that this difference reflects certain antigenic divergencies, though what these are remains to be determined. There are three possibilities. The production of the vaccinial variant of small-pox virus by adapting it to the tissues of a more or less resistant species, such as the cow, may merely be associated with the loss of an antigen; vaccinia virus might be just a degraded variant of small-pox virus possessing in common with the latter an important basic antigen. Or it might be not only that there was a loss of an antigen but that an entirely new antigen, responsible for the new species range of infectivity, was developed by the variant vaccinia. The third possibility would assume that small-pox virus possessed, in addition to the basic antigen, two antigens: one responsible for the invasiveness of this virus for man, the other being present as a rudiment only. Adaptation of the small-pox virus to the unsuitable environment represented by the tissues of the cow or rabbit would result in the loss of the specific antigen and the development of the rudimentary antigen, which now becomes the specific antigen of vaccinia virus.

There are, in the main, two ways in which these hypotheses may be put to the test of experiment. One is to submit the two viruses and their antisera to a comparison by cross-serological tests, and the other depends on cross-protection experiments in animals. The former method is not without difficulties, but Amies[1] has submitted vaccinia and small-pox viruses to a comparison by the agglutination reaction, and though he found definite differences between the two the precise nature of these was not determined. It is, however, by cross-protection experiments in animals that most investigators have attempted to settle the relationship of vaccinia and small-pox, and the majority have found that these two viruses do not give complete cross-protection in animals. The most recent experiments in this direction, those of Horgan and Haseeb,[2] have led to much the same conclusion. They used the monkey as experimental animal, and in their investigations included a strain of alastrim as well as strains of small-pox and vaccinia viruses. In no case was the cross-immunity completely reciprocal, vaccinia virus giving complete protection both against itself and the other two, whereas variola and alastrim protected completely against themselves but by no means invariably against the others. The drawback to experiments of this kind is the different degree of susceptibility shown by the monkey to the three viruses, vaccinia virus having a much higher degree of infectivity for this species of animal than either variola or alastrim. And since immunization cannot be made with killed virus, owing to the negligible immunizing power possessed by these viruses when dead, it is extremely difficult, if not impossible, to control the immunizing dose used. Even with a comparable infecting dose the virus with the greatest infectivity is going to out-multiply the others, and so provide a greater immunizing dose and antigenic stimulus. Of the three it is vaccinia virus which grows most abundantly in the monkey's tissue, and it is precisely this virus which gives the most solid and all-embracing immunity. Horgan and Haseeb are well aware of this fallacy and give it careful consideration in summing up their findings. They conclude, however, that the cross-protection afforded by these three viruses is due to a common group antigen essential for immunity, and agree with Gordon[3] that this basic antigen probably forms a larger part of vaccinia virus than it does of the small-pox virus. Vaccinia virus for them is a degraded variant of small-pox virus which has lost the specific antigen responsible for the virulence of the latter virus for man. They believe that this antigen plays no part in the immunity to small-pox; this is dependent on the basic group antigen possessed by both vaccinia and small-pox viruses. And they think that the loss of this specific small-pox antigen and the uncovering of the basic group antigen, which they believe occurs when the variant vaccinia is formed, accounts for the increased infectivity of vaccinia virus for animals like the monkey and rabbit.

They may be right, but it is difficult to believe that a specific antigen of small-pox virus, which is responsible for its virulence for man, should play no part in the immunity to small-pox, and it seems unlikely that degradation of the virus should make it more infective for any animal species. Were it possible to use man as the experimental animal for the cross-protection experiments with these three viruses it is probable that findings opposite to those given by monkeys would have been obtained; this way round variola would probably have given the dominant immunity.

[1] *Brit. J. exp. Path.* (1934), **15**, 314.
[2] *J. Hyg., Camb.* (1939), **39**, 615.

THE ACTION OF DIGITALIS

The theory of digitalis therapy has undergone some strange vicissitudes. Originally used in pulmonary tuberculosis, it was then given for such a number of other diseases that the omission of heart disease and dropsy from the list is all the more striking. Withering in 1785 found that an old herbal remedy for dropsy owed its efficacy to digitalis but failed to observe its action on the heart. Till the beginning of this century digitalis was believed to be diuretic, but this is now regarded as a secondary effect of the improved circulation. The beneficial effect upon the heart was attributed among other things to slowing, allowing of more diastolic recovery, and to correction

[3] *Spec. Rep. Ser. Med. Res. Counc.*, No. 98 (1925), London.

of over-distension. H. Gold and M. Cattell[1] point out that improvement may occur without slowing, and that the physiological response to effort is a quickened beat, while Wiggers showed that a normal heart (and, he might have added, one in paroxysmal tachycardia) may beat up to a rate of 200 before the circulation begins to suffer. Slowing is therefore probably the result and not the cause of the improvement. As to cardiac over-distension, Starling's "law of the heart" enunciates that its systolic energy is proportional to the degree of previous diastolic stretching. Normally, then, dilatation is a physiological response to increased work. It had therefore to be assumed that a critical point is reached, presumably caused by high venous pressure in a diseased heart, above which this adaptive mechanism failed, and digitalis was said to enable this over-stretched muscle to shorten again. But McMichael found that diseased hearts are less susceptible than normal ones to increments of venous pressure, and the experimental evidence is against the idea of overstretching.

When the nature of auricular fibrillation was revealed by the electrocardiograph and it was noted that digitalis diminished conductivity in the auriculo-ventricular bundle, while much alleviating symptoms, it was declared by enthusiasts that the sole effect of digitalis was on conductivity, and that therefore its only therapeutic value was in auricular fibrillation. It was several years before cumulative clinical experience was able to overthrow this dogmatic assertion, which received a final blow when H. C. Peters and M. B. Visscher[2] demonstrated that under digitalis heart muscle not only puts out more energy but utilizes it more efficiently, converting more into external work. What explanation remains? Gold and Cattell measured the tension with the isometric lever in the isolated papillary muscle of a cat's heart immersed in Ringer's solution, and found that all the digitalis glucosides improved systolic tension while the diastolic tension remained constant. They observed in the isolated heart–lung preparation that under digitalis the heart loses potassium and that there is a relative increase in its calcium content. This is a most interesting observation for several reasons. Gaskell long ago showed the depressing effect of potassium on the frog's heart, which could be ultimately reduced to diastolic standstill in the same position as that produced by vagus inhibition. Years later Zondek maintained that excitation of the vagus can be produced by increased concentration of the potassium ions. Long before that Locke had shown that the addition of calcium to Ringer's solution much improved its influence in maintaining the heart beat in perfusion experiments. And in the discussion at a recent meeting of the Association of Physicians stress was laid on the importance of not giving potassium salts in cases of failing heart. In addition to this confirmation of experimental and clinical observations, it is further evidence of the new light which is being thrown on many problems by a study of mineral metabolism and of the close association of chemical and nervous mechanisms which has been such a striking generalization in this century.

The conclusion seems to be that digitalis improves the function of the heart in cardiac failure by direct action on the muscle without primarily changing its diastolic length, and accomplishes this through a biochemical change in its mineral metabolism. This does not dispose of its usefulness in also blocking the way to irregular stimuli from auricle to ventricle in auricular fibrillation.

[1] *Arch. intern. Med.*, 1940, **65**, 263.
[2] *Amer. Heart J.*, 1936, **11**, 273.

METHAEMALBUMIN AND THE ELIMINATION OF EXTRACORPUSCULAR HAEMOGLOBIN

Until quite recently our knowledge concerning the catabolism of haemoglobin was practically limited to the observation that bilirubin is one of the principal products of haemoglobin breakdown in the animal body. The stages by which this transformation was achieved were quite obscure, and even the site of the reactions was disputed until it was established that the cells of the reticulo-endothelial system play at least an important part in the normal production of bilirubin. It is surprising that physiological knowledge of such an important substance as haemoglobin should have lagged so far behind the precise chemical investigations upon its constitution carried out by Willstätter, Küster, and, latterly, by Hans Fischer and his collaborators. The work of Lemberg[1] has gone far to remedy this state of affairs as regards the mechanism of the transformation of haemoglobin into bile pigment, but in the meantime quantitative chemical and biochemical investigations upon the urinary and faecal porphyrins in health and disease have emphasized that these substances also are related to haemoglobin, perhaps in breakdown as well as in synthesis, and cannot be overlooked in any acceptable summary of pigment metabolism. Methaemoglobin and haematin were also found at times to obtrude awkwardly into the picture. Hamilton Fairley, whose article on the fate of extracorpuscular circulating haemoglobin appears at page 213 of this issue, has now done clinicians and biochemists real service by adding another chapter to the knowledge of haemoglobin metabolism. His observations, in collaboration at times with Foy and Bromfield, demonstrate that haematin can combine with the albumin of human or simian sera to form an addition complex which he has termed "methaemalbumin."[2] The absorption spectrum is similar to, though distinct from, that of methaemoglobin, the band in the red being at 6,230 Ä in place of 6,300 Ä, but like the latter it forms a haemochromogen upon reduction. Methaemalbumin was first found in the blood of blackwater fever patients, but it can also be synthesized *in vitro* by incubating haemoglobin with plasma or by the addition of faintly alkaline solutions of haematin to crystalbumin. *In vivo* it is encountered after severe intravascular haemolysis, such as that following incompatible blood transfusion, and could be expected to arise also in any circumstances in which haemoglobinaemia was present. This last expectation has now been realized by Fairley in cases receiving haemoglobin solutions intravenously. By a critical examination he has shown that Schumm's test for haematinaemia actually reveals the presence of methaemalbumin, and this test, which is much more sensitive than direct spectroscopy, was found to be invariably positive after the intravenous injection of haemoglobin into monkeys or man. Rimington at the same time found an increase in faecal porphyrin excretion. Extracorpuscular circulating haemoglobin is treated by the body as a foreign substance and three mechanisms are thus known capable of assisting its elimination: (1) absorption by the reticulo-endothelial system with subsequent formation of bilirubin; (2) intravascular catabolism, giving rise to methaemalbumin,

[1] *Nature*, 1937, **139**, 1016.
[2] Ibid., 1938, **142**, 1156.

which is finally eliminated by the liver largely as Series III porphyrin ; (3) renal excretion. The extent to which each mechanism operates is determined largely by the quantity of haemoglobin concerned and the capacity of each system to handle the substance efficiently.

GERMAN MEDICINE, RACE, AND RELIGION

Abnormal preoccupation with a particular subject often points to an uneasy conscience. The medical press of Germany for some time has published articles dealing with racial problems in a manner which suggests that the medical profession has to subscribe to the anthropological absurdities of Nazism. For example, a lecture given last year by L. Ranker on racial questions and colonies, and recently printed,[1] consists of a very ordinary statement of the obvious disadvantages of miscegenation with a reference to *Lebensraum* in the first paragraph and a hint at the end that the strict racial laws of the new Germany are one more reason for expansion in the colonial field. Much less obvious, but almost certainly intended to support these "racial laws," is a contribution on race and industrial problems by T. Fürst.[2] The first part of this article deals with the location of industry and the possible psychological effects of moving workers from one district to another. The second concerns the biological aspects of the craftsman, including anthropological considerations and the influence of heredity upon the numbers of skilled workmen available in particular localities. Another side of the racial–religious problem is discussed by H. Kolb[3] in some very interesting observations on the birth rate, infant mortality rate, and the distribution of Protestants and Catholics in the province of Baden. Although to-day there are 58.4% Catholics in the population of this district as compared with 38.2% Protestants, there is a definite tendency for the proportion of the Protestants to increase despite a higher birth rate among the Catholics. This is found to be due to a higher infant mortality among the Catholics, and the causes for this are discussed. It is clearly not due to the illegitimacy rate, for this is actually higher among the Protestants. The standard of infant care is obviously an important factor, and no one will quarrel with the statement (a quotation by Kolb from another authority) that "the higher or lower social status can in the National-Socialistic State never be accepted as an excuse for the infant mortality rate." There is another interesting comparison of mortality rates in a contribution by M. Staemmler and E. Bieneck[4] on the causes of death as shown in statistics among the Jewish and non-Jewish population of Breslau over a ten-year period from 1928 to 1937. The first striking feature of the analysis is the change in the age distribution of the two "populations" during this time. There is now a smaller birth rate among the Jews and a relatively larger proportion of old people, which makes for considerably higher death rates for such disorders as cancer, diabetes, and circulatory failure, and lower rates for tuberculosis and infectious diseases, as compared with the non-Jewish population. The gross mortality rates given over a longer period than that chosen for detailed analysis reveal that, whereas in 1925 the death rate (per 1,000 living) was 14.2 for Jews and 13.1 for non-Jews, in 1937 the figures were 21.2 and 12.3 respectively. The fact that mortality from tuberculosis among Jews during the period 1928–37 was lower than among non-Jews is attributed to a better social status and to the elimination over a long period of susceptible families. The infant death rate was also found to be lower among the Jews than the non-Jews, but this is held to have nothing to do with race, since in all countries a low birth rate is associated with a low infant mortality. It is interesting to note a statement in this analysis which has nothing to do with the mortality rates under discussion, but is another example of the influence of politics on medicine in Germany. Before 1933, it is stated, the average number of illegitimate births amounted to 20% of the total for the whole population, but only 5% to 6% for the Jews. Since 1933 the rate for non-Jews in Germany has decreased to 11%, but is increasing among the Jews. This is said to be associated with enforcement of the notorious Nuremberg laws. In regard to the greatly increased death rate among the Jews it is pertinent to ask if this also can be connected with modern legislation and the racial theories now *de rigueur* in the Third Reich. Unfortunately the analysis fails to record the death rates from "accidents" or "violence" or the barbarities of the concentration camp.

[1] *Wien. klin. Wschr.*, 1940, **53**, 405.
[2] *Münch. med. Wschr.*, 1940, **87**, 424.
[3] *Z. Hyg. InfektKr.*, 1940, **122**, 436.
[4] *Münch. med. Wschr.*, 1940, **87**, 447.

PANTOTHENIC ACID: THE CHICK ANTI-DERMATITIS FACTOR

The chick anti-dermatitis factor has been identified with pantothenic acid. Its existence was first detected in the filtrate from an aqueous liver extract from which various substances had been adsorbed on fullers' earth at *p*H 1–3 and filtered off. This factor, which is now prepared synthetically,[1] is thought by Macrae, Todd, Lythgoe, Work, Hind, and el Sadr[2] to be identical with one of three liver filtrate factors which, in addition to aneurin, riboflavin, and nicotinic acid, are necessary for the growth of the rat. Its action on the animal body is somewhat obscure. Chicks receiving it in their diet do not develop the dermatitis, which is often accompanied by certain nervous symptoms. Phillips and Engel[3] found that riboflavin prevented neuromalacia of the peripheral nerves, but not pathological changes in the spinal cord. Nicotinic acid and vitamin B_1 were similarly ineffective, but synthetic pantothenic acid made from the β-alanine ester and the acid chloride portion of the alkali-inactivated liver concentrate was highly effective in preventing the changes in the spinal cord. No lesions were observed in the brains of the chicks with dermatitis, but degenerating fibres were found in all segments of the cord down to the lumbar region. The distribution of pantothenic acid in various foodstuffs has been investigated by Waisman, Mickelsen, and Elvehjem.[4] Since no standard of measurement was available it was impossible to state the potency of the foods in units of activity. The estimation was therefore made from the amount found necessary to protect chicks from developing the typical symptoms of dermatitis when fed on a particular diet. Liver and kidney were the richest sources of pantothenic acid, 2% only being needed to ensure complete protection and to promote growth. Beef heart and beef brain had to be given as 5% of the diet, beef pancreas as 10%, and beef tongue as 15%. Pork, beef, lamb, and veal muscle were required in amounts between 25% and 35% of the diet. Stewing reduced the potency of these meats to about one-third that of fresh meat, but frying did not destroy it at all. It is thus thought that the loss during stewing was due to its dissolving in the cooking water. No chemical or physical method of determining pantothenic acid has yet been devised.

[1] *Science*, 1940, **91**, 246.
[2] *Biochem. J.*, 1939, **33**, 1681.
[3] *J. Nutrit.*, 1939, **18**, 227.
[4] Ibid., 247.

TREATMENT OF SCABIES

Therapeutics as a whole has advanced very rapidly during the present century, but there are a few subjects that have been little affected by these changes. This is particularly true of skin infestations such as pediculosis and scabies. Prof. P. A. Buxton in a recent discussion remarked that no advance had been made in the technique of delousing since 1918; similarly, the treatment of scabies is still based on sulphur ointment, a remedy which has been used for this purpose for centuries. In most other fields it has been found possible to effect great advances on traditional remedies, and the reason for absence of change in this case is probably lack of research rather than the impossibility of improving established methods. Two American authors, Thomas and Miller,[1] have recently investigated the action of the insecticide rotenone in scabies. Rotenone is one of the active principles of *Derris elliptica*. Crude or partly purified extracts of this plant have found a wide employment in gardens and farms. They are used to kill aphis and in the treatment of warble-fly infestation. The authors used a 1 or 2% lotion of rotenone on twenty-four unselected cases of scabies. Cure followed in all cases, and in the majority four applications resulted in complete involution of the lesions in three or four days. The preparation did not stain the bedclothes or underwear and was non-irritating; indeed the patient was not conscious of its presence on the body. This sounds a very great advance on the traditional treatment with sulphur ointment. The authors recommend rotenone for more extended trial in the treatment not only of scabies but also of other dermatoses of parasitic origin.

A NUTRITION SURVEY

If a wide enough view is taken of the meaning of the word "nutrition" the surveys which the Board of Education have promoted, and are now accepting as a substitute for part of the routine medical inspections, go far toward meeting the plea put forward by many school medical officers for a change in the nature of their work. A survey of this kind begins with a rapid scrutiny of a large group of children leading to the selection of those of poor physique requiring more detailed investigation. An interesting report has been issued by Dr. E. C. Downer, M.O.H. for Chorley, as the result of such a survey begun in February and amplified in March and April of this year.[2] When the 2,776 children examined were classified according to the Board of Education's scheme the nutritional state in 178 (6.4 per cent.) was excellent, in 2,049 (73.8 per cent.) good or average, in 540 (19.4 per cent.) slightly poor, and in nine (0.3 per cent.) very poor. Altogether, then, 549 were regarded as presenting evidence of malnutrition, a term which Dr. Downer prefers to "undernourishment," as it emphasizes the fact that lack or shortage of food was not necessarily the cause. The special merit of Dr. Downer's careful report is that he succeeded in carrying out a thorough investigation of 480 of the 549 subnormal children, a parent or responsible person attending with more than 400 of them to give information under confidential conditions. He was thus able to form a carefully considered opinion as to the cause of the condition. In 334 it was attributed to present, transient, or easily remediable ill-health; in 135 to past or chronic ill-health; in only seventy to actual shortage of food; in ninety-nine to improper or inappropriate feeding; in 214 to improper hygiene, habits, or environment; and in five to other causes. It will be observed that the same child often appears under more than one of these causes, and that past illness accounts for a large amount of malnutrition, as Spence found in his survey of pre-school children in Newcastle.[3] When these causes were more closely analysed it appeared that only about twenty of the seventy cases of food shortage were probably due to sheer poverty. Running through the account of the other fifty and of those suffering from improper feeding or habits is a lamentable story of parental ignorance, enforced neglect from employment of mothers, and a general lack of parental control. Children are allowed to eat practically what they choose, to remain out of bed till late hours, and to refuse dental or other special treatment prescribed for them. This state of affairs has been so aggravated during the war and the consequent closure of schools that malnutrition has risen from 10.6 per cent. in 1939 to 19.7 in 1940. It affected 29.5 per cent. of 765 children in schools newly reopened at the time of the survey, as against 16 per cent. of the 2,011 in schools which had not been closed. The evil consequences of school closure are therefore more than educational.

INHERITANCE OF ACQUIRED RESISTANCE TO TUMOUR GRAFTS

Russ and Scott[4] record observations on the inheritance of acquired resistance to grafts of the Jensen rat sarcoma which, in their opinion, "provide evidence in support of the view that this acquired characteristic is transmitted to the offspring to some extent." They used a selected strain of rats highly susceptible to grafts of the Jensen sarcoma; growth was progressive and fatal in about 95% of the rats. By means of certain technical manœuvres growth was checked and the rats survived; they were then resistant to further implantations of the Jensen sarcoma. The offspring of these rats were partially resistant to grafts which, on the average, attained about half the size of those in the control rats and regressed about four times as often. Resistance was transmitted when only the male parent had been immunized, and it persisted without evident diminution in the second generation. It is now believed that transplantation of tumours is restricted in the same kind of way as blood transfusion; inherited disparities between donors and recipients provoke disastrous reactions. Animals which have been inbred by brother-to-sister matings for a sufficient number of generations have substantially the same complement of Mendelian genes and the strain is homozygous or "pure." Normal or tumour tissue from an animal of a pure strain survives transplantation into any other animal of the same strain, and there is no known method of inducing resistance against such transplantation. The results of transplantation into other strains are variable, and depend, according to the genetic theory, on the degree of similarity between tumour tissue and host, the degree being determined chiefly by Mendelian genes. It is possible that transplantable tumours, including the Jensen rat sarcoma, which after many years of transplantation grow in unrelated strains, have undergone genetic simplification and are consequently less discriminating in their requirements. Nevertheless the transplantation differs from that within pure strains because resistance can be induced experimentally. The importance of genetic factors is beyond doubt, but they do not account for all the phenomena of tumour

[1] *Amer. J. med. Sci.*, 1940, **199**, 670.

[2] Borough of Chorley Education Authority. Nutrition Survey, February, 1940.

[3] City and County of Newcastle-upon-Tyne: Investigation into the Health and Nutrition of Certain Children between the Ages of 1 and 5 Years, December, 1933.

[4] *Proc. roy. Soc.*, B, 1939, **128**, 126.

transplantation, and there is need for caution in the use of tumour grafts as tests of the genetic constitution of hosts. There are examples of transmissible leukaemias and tumours which grow in a consistently low proportion of mice of pure strains, and McDowell[5] remarks that since all mice of a pure strain have the same genetic constitution the scale between susceptibility and resistance in these examples is turned by uncontrolled non-genetic variables. Russ and Scott's observations do not decide whether the inheritance of resistance was Mendelian or not; hybridization experiments are desirable. Their rats, though inbred, are not certainly genetically pure. It is possible that the inheritance belongs to the non-Mendelian or "extrachromosomal" type, which has been described but not elucidated. It is plain that highly complex processes are involved, and it is permissible to hesitate before deciding how far experiments with transplantable tumours are applicable to the general biological problem of the inheritance of acquired characters.

CHEMOPROPHYLAXIS OF RHEUMATIC FEVER

Those who regard sulphanilamide as a dangerous drug and certainly unsuitable for prolonged administration will be astonished at the temerity of C. B. Thomas and F. France[6]; these authors gave the drug continuously for periods of months to rheumatic children. A. F. Coburn and L. V. Moore,[7] who have also employed this method, now report further results obtained with it. Three daily doses of 1 gramme were given throughout the school year (October to July) to children who had been subject in the past to repeated attacks of rheumatic fever; in small children the total daily dose was 2 grammes. Toxic effects were produced within a few days in about 10%, and these children were transferred to the control group; those who tolerated the drug for a fortnight showed no ill effects at any later stage, and apparently without exception continued to take it for the whole period of nearly a year, during which the blood sulphanilamide level remained at from 4 to 5 mg. per 100 c.cm. of blood. One comment to be made on this is that prolonged administration has evidently less to do with severe toxic effects, such as agranulocytosis and anaemia, than has sometimes been thought; when such results ensue, idiosyncrasy or some other deleterious factor must be at work, and no feasible precautions can altogether avert these rare disasters. It is even possible that the reverse is true, and that some degree of increased tolerance to the drug can be acquired. The subjects of this study were kept under daily clinical observation, and laboratory investigations performed at regular intervals included throat cultures and estimations of the sedimentation rate and of the antistreptolysin content of the blood. The object of the treatment, which was of course to prevent those attacks of streptococcal throat infection which precede and appear to precipitate an attack of rheumatic fever, seems undoubtedly to have been achieved. In a total of 184 treated children only 3% developed haemolytic streptococcal throat infections, and only one child had an attack of rheumatic fever. In untreated children the incidence of throat infections was about 50% and of rheumatic attacks 20% in one group and 35% in another. Although active throat infection was prevented, some children remained carriers of haemolytic streptococci for months during treatment. It has been observed before that the carrier state is unaffected by treatment with sulphanilamide; bacteria leading a saprophytic existence on mucous surfaces are clearly not subject to its action. It is useful to know that prolonged treatment with sulphanilamide is feasible, and in rheumatic subjects it evidently deserves extended trial. It is difficult, however, to think of any other condition in which this method is indicated. At least let there be a clear distinction between the demands of prophylaxis, in which there is no time-limit, and treatment, of which it is still true that unless an effect is achieved within a week or two it probably never will be. It would be a pity if this very special example of the value of prolonged sulphanilamide administration were to encourage undue persistence with the drug in infections not responding to it.

[5] *Amer. J. Cancer*, 1936, **26**, 85.
[6] *Johns Hopk. Hosp. Bull.*, 1939, **64**, 67.
[7] *Med. Clin. N. Amer.*, 1940, **24**, 633.

HEALTH OF THE LONDON SCHOOL CHILD

At the census of 1881 36% of the population of England and Wales were children under the age of 15; fifty years later the proportion had fallen to 24%. This decline, too, has been differential, so that our child population has come proportionately more from the social classes least able to afford them. On the other hand, rising standards of living and of education, together with social legislation and public health work, have brought about substantial improvements in child mortality rates and, doubtless, in physical fitness and health. The former is easy to measure from the Registrar-General's returns; the latter is complicated by changing concepts of what constitutes a departure from an ideal standard of health or by the care with which defects are looked for and noted. In spite of these difficulties it should be possible to gather something of value from the enormous number of annual routine examinations of school children, and in a recent paper W. J. Martin has usefully brought together much of the data published[1] by the school medical officers of the L.C.C. As reflections on the improvement in environmental conditions he notes that in 1911 17.8% of London's population was living more than two to a room and in 1931 13.1%; in 1911–14 one child in seventeen at elementary schools was said to be poorly clothed or shod, in 1930–5 only one in 143. Turning to some specified defects, there has been an appreciable decline in the proportion of children entering school life with diseases of the heart, while the liability to develop such during school life has also become distinctly less. The figures for defects of the lung show an improvement, and there is a greatly reduced incidence in rickets (at each date twice as common in boys as in girls). During the last war there was an increase in the number of children said to be suffering from anaemia—judged on clinical observation only—but since then the incidence has much declined. A very large proportion of the defects recorded are, of course, those related to the nose and throat, and here it is only in the older children that improvement is observed. Taken at their face value, the statistics of entrants show a negligible difference between 1911 and 1935. Similarly, the proportion said to have sound health has not changed materially at entry to school, but the state of affairs is much better in older children. On the whole, therefore, we have here a very favourable contrast between the health of the present London school child and that of his predecessors. The only really black spot is the road accident rate. Over the last thirty years the number of children killed and injured in street accidents in the metropolitan police area has increased nearly threefold—and this ignores the fact that the child population itself has substantially declined.

[1] *Ann. Eugen.*, 1940, **10**, 18.

Nova et Vetera

DEAN SWIFT'S DEAFNESS

Since Sir William Wilde in 1849 diagnosed Swift's chronic illness as due to cerebral congestion of a periodic character, and Bucknill in 1882 more precisely as Ménière's disease, numerous attempts have been made to explain some features of Swift's life which are not readily explicable on the basis of these diagnoses. Bucknill tried to account for such residual features as aphasia, right facial paralysis, and, possibly, inability to use the hands, by a diagnosis of hemiplegia in addition to Ménière's disease. Until Wilde's essay appeared it was generally assumed that Swift was insane. The biographers certainly made much of his eccentric behaviour, and it is indeed difficult to draw a hard-and-fast line between the admitted senile dementia from which Swift suffered in his last five years and the growing eccentricities which induced him in his sixth decade to chase his guests round the Deanery for exercise. It was Wilde's achievement, however, to show that there was no deterioration of Swift's intellectual capacity until the terminal phase, and with this view T. G. Wilson fully agrees.[1] In reviewing the evidence on which the various diagnoses of Swift's illness have been advanced, Wilson accepts Ménière's disease and senile dementia but rejects hemiplegia. He shows that the need for introducing an additional lesion arose out of a series of misunderstandings and a reliance by Bucknill on secondary sources. He admits the existence of the aphasia, but argues that this must be ascribed to the senile dementia. Swift's inability to use his hands is disputed, and Wilson shows that this reading is based on an obscure passage describing Swift's behaviour towards the terminal stage. Although his meat was "served up ready cut," the fact that he would "eat it walking" argues against hemiplegia. Further, the right facial palsy appears to be poorly substantiated. According to Wilson Sir Walter Scott's reading of the death masks was quite erroneous and Wilde's correction of Scott's errors do not go far enough. From a re-examination of these masks Wilson is satisfied that there is no evidence whatever of any facial palsy. He concludes, therefore, that Swift suffered from Ménière's disease, which plagued him throughout his life, and from senile dementia after the age of 70, which could hardly have influenced his creative activities to any extent. Ménière's disease fits in with Swift's symptoms so well that there is no difficulty in accepting this diagnosis to the exclusion of such alternatives as otosclerosis and syphilitic labyrinthitis. Jonathan Swift's contemporaries understood his bodily ailments no more than they understood his "fierce indignation which lacerated the heart."

[1] *Irish J. med. Sci.*, 1939, **6** s., 241.

OLD PHYSICIANS OF BUXTON

Two lectures in the nature of a medical history of Buxton have been delivered to the Buxton Archaeological Society by Mr. Ernest Axon, F.S.A., and have been reprinted by the *Buxton Advertiser*. In the first lecture Mr. Axon dealt with some of the doctors who before 1700 were connected with or wrote about the Derbyshire spa. The first book in praise of Buxton waters was by Dr. John Jones in 1572. It was entitled *The Benefit of the auncient Bathes of Buckstones, which cureth most greeuous Sicknesses, neuer before published*, and was dedicated to the Earl of Shrewsbury, the patron of the baths. Jones pleaded for a resident physician, that he might not only "counsel people how better to use God's benefits," but also "adapt theire bodyes, makinge artificiall Bathes." He also had a scheme whereby rich patients were to pay certain charges according to their rank, the resulting revenue to be divided between the poor and the resident doctor. The scale of charges was to range from 12d. for a yeoman to £3 10s. for a duke.

The next physician of importance to write about Buxton was Sir John Floyer, a physician who valued the tepid Buxton waters for their comparative coolness. His book, *An enquiry into the right use and abuses of the hot, cold and temperate baths in England*, was published in 1697, was mostly devoted to the Buxton waters, and was dedicated to the Duke of Devonshire. Floyer comments on the fact that the bathers went in naked, and thinks "the men ought to use drawers, and the women shifts of linnen or flannel. But custom hath taught the sexes to have separate times of bathing." In Floyer's time the common practice was to stay at Buxton a week; Jones had advised a much longer period—from fourteen to forty days. Another medical writer was Charles Leigh, whose book, published in 1700, speaks of cases of scorbutic rheumatism "in persons that could not go before without the help of Crutches, who came from thence to Manchester on Foot without them."

In his second lecture Mr. Axon gave some account of Buxton waters since 1700. In 1734 Dr. Thomas Short published an important work on the history of the mineral waters of Derbyshire and other counties. In 1733 Dr. John Byrom of Manchester visited Buxton, and after drinking the water, which he "preferred to Scarborough much," met a patient of Dr. Cheyne's "who was given up at forty and is now above sixty, very hearty considering." Ten years later Byrom was again in Buxton, and his diary contained the first reference to a local medical man, for he says he "lay at the apothecary's up town" and had his meals at the well. In 1768 a York doctor, Alexander Hunter, published a book in praise of the virtues of Buxton waters. He urged that the patient should always consult a physician before taking the waters. In 1769 mention is made of "Mr. Buxton, a worthy and sensible apothecary near the Wells." This was Samuel Buxton, who later became "Mr. Buxton, surgeon"; according to a medical list in 1779 he was the only medical man in Buxton; he died there in 1826. Dr. George Pearson wrote a work on the chemical history of the Buxton springs in 1784. During the greater part of the eighteenth century Buxton had no resident physician, but more or less eminent physicians, ordinarily practising at a distance, spent some part of the season in the town or accompanied wealthy patients to the spa. In the *Medical Directory* for 1853 the names of five doctors practising there are given.

FÉLIX GERLIER, 1840-1914

This year marks the centenary of the birth of Dr. Félix Gerlier, a Swiss physician who was born at Ferney-Voltaire, the son of a local practitioner. He qualified in Paris with a thesis on death from cardiac concretions in diphtheria, and then joined his father in practice in his native town. He took part in the Franco-Prussian War as medical officer in the French Army, and was for several years mayor of Ferney-Voltaire, where he remained until his death on September 6, 1914. He is best known for his classical description of epidemic paralysing vertigo, to which his name has been attached. His first account of the disease was given before the Société Médicale de Genève, of which he was a corresponding member, in November, 1886, and was published in the following year in the *Revue Médicale de la Suisse Romande*. His subsequent papers on the subject appeared in the same journal in 1887, 1888, and 1891, in the *Archives Générales de Médecine* in 1891, and in an abbreviated form in the *Bulletin de l'Académie de Médecine* in 1900. Gerlier's disease has a very limited geographical distribution, being found only in the Pays de Gex in the neighbourhood of Ferney, and in Japan, where it is known as *kubisagari*. Outbreaks occur in May and June, reach their height in the summer, and cease in the winter. The disease has been found in cats and fowls, and appears to have a close association with horses and cattle, though these animals do not suffer from it themselves. The symptoms consist in a sudden attack of vertigo and generalized muscular weakness lasting for about ten minutes and recurring daily or more frequently. Complete recovery takes place with the onset of cold weather. There is no specific treatment.

The March issue of the *Bulletin of the History of Medicine*, which is dedicated to Dr. Arnold C. Klebs in honour of his seventieth birthday, contains articles by Sir D'Arcy Power, Sir Humphry Rolleston, Professor V. Putti, Drs. J. F. Fulton, George Sarton Lynn Thorndyke, Raymond Pearl, and others.

THE SCHÄFER METHOD OF ARTIFICIAL RESPIRATION

The Royal Life Saving Society recently assembled a number of London medical officers of health and others for a demonstration of the Schäfer method of artificial respiration, a method in which the closest attention to detail may make the difference between resuscitation and death. The matter is the more important because of the great liability to asphyxiation during air attack; the blast of air created by high-explosive shells on bursting may knock people breathless without actual wounding. Waves of intense smoke from burning buildings, escaping gas from broken pipes, and short-circuiting of electric cables may produce casualties which call for artificial respiration. The principle of the Schäfer operation was described by Mr. George Rew, the society's official lecturer, as the transference of the weight of the trunk of the operator from his heels to his straight arms, his hands being on the small of the patient's back with the patient in the prone position. No other muscular effort was needed. The movements necessary for the complete cycle of expiration and inspiration should occupy five seconds, two seconds being taken up by pressure (for expiration), in which the operator swung slowly forward so that the weight of his body was conveyed to his hands, and three seconds by relaxation (for inspiration), in which the operator swung slowly backward to his first position so that the weight was removed from the hands, which, however, remained in place. Inexpert operators performed the cycle in three seconds instead of five, which was quicker than the normal breathing time of twelve expirations and inspirations to the minute. Another fault was to kneel too far back on the thighs of the patient so that some bending of the arm was necessary, which was likely to tire the operator. The one advantage of the astride method, the lecturer continued, was the central approach, the operator being directly over the patient, but if the operation were long continued in such a position the operator was likely to collapse. Schäfer had experimented with the astride method but had not advocated its general use. From a position at the side of the patient the manœuvre could be carried on for two hours, but in the astride position, owing to the strain on the ligaments of the widely separated thighs, it was impossible to maintain the action for anything like that time. With the side position a relief operator could take over the action from the other side without any waiting or breaking of the cycle.

Local News

ENGLAND AND WALES

Epsom College Scholarships and Grants

The council of Epsom College will shortly proceed to award St. Anne's Scholarships to girls attending Church of England schools. Candidates must be fully 9 years of age, and must be orphan daughters of medical men who have been in independent practice in England or Wales for not less than five years. The value of each scholarship is dependent upon the means of the applicant and the locality and fees of the school selected. Educational grants will also be available from the Sherman Bigg Fund for children of either sex. These grants are not restricted to orphans or to members of any religious denomination, but candidates must be of public school age and in need of such help. Forms of application for the vacant scholarships and grants can be obtained from the secretary, Epsom College, Epsom, Surrey, and must be completed and returned by October 14.

L.C.C. and the Cancer Acts

Before the war the L.C.C. deep *x*-ray therapy units at Lambeth and Hammersmith Hospitals were working at full capacity. Since hostilities began the demands on these units have greatly increased, and at Lambeth the five *x*-ray tubes are in use for twelve hours a day. Hence it is necessary to provide additional facilities for the diagnosis and treatment of cancer, and it is considered that the need can be most effectively met by enlarging the existing unit at Hammersmith Hospital. For this purpose it is proposed to acquire two additional *x*-ray therapy tubes and generators at an estimated cost, including incidentals, of £5,575. A further supply of radium will be necessary for use in conjunction with the *x*-ray apparatus, and the National Radium Commission is willing to lend 500 mg. The additional staff required for the enlarged unit includes a radiotherapist, an assistant physicist, two nurse radiographers, and four deputy sisters.

INDIA

Public Health in India

The comment is made in the report for 1938 of the All-India Institute of Hygiene and Public Health, Calcutta, that although it is fully recognized that India is badly in need of a vigorous forward policy in public health organization, even the small number of technically trained personnel available are unable to find employment in this national endeavour. Thus of the students who have qualified from the Institute only a small proportion—less than half—are occupying public health posts. The number of those who are still engaged in private practice after obtaining their public health qualifications is large and on the increase. This paradoxical situation arises from the fact that the authorities find it difficult to launch extensive schemes for health protection because of the magnitude of the problem and the paucity of funds. Most of the available funds are already appropriated by curative medicine, which is able to yield, as preventive medicine is not, immediately demonstrable results. The report gives short accounts of researches into cholera, epidemic dropsy, salmonella poisoning, blackwater fever, and malnutrition. In the report on cholera the director of the Institute, Dr. R. B. Lal, states that the endemic position of districts in south-western Bengal has been redefined, and the new methods of forecasting cholera epidemics have been successfully applied to the Calcutta experience for the third year in succession.

Hospitals and Dispensaries in the Punjab

The triennial report on the working of hospitals and dispensaries in the Punjab for the years 1935–7 states that the need for private support of the efforts made by the Government to initiate and conduct these institutions is being increasingly recognized by the community, and that valuable donations were received for new buildings and for special apparatus. Medical education of young female students is becoming more popular, the numbers of applicants often being limited only by inadequate accommodation. The Punjab Government makes grants for the training and provision of women sub-assistant surgeons and midwives, thus increasing the number of institutions where women can be treated by members of their own sex. Colonel G. Jolly, I.M.S., Inspector-General of Civil Hospitals in the Punjab, lists sixteen of the most urgent needs of the medical department. Among them are a system of subsidized general practitioners so as to bring medical relief to every village in the Punjab in the shortest possible time; better provision of medical aid for women in rural areas, particularly at the time of childbirth; the appointment of women medical practitioners to each hospital at district and tahsil headquarters; ophthalmological centres and tuberculosis clinics, wards, and sanatoria; and additional hospital accommodation. Improved communications and the extension of motor transport are steadily leading to an increased demand from the people for better facilities at hospitals and dispensaries in rural as well as urban areas. It is stated that the work of central supervision has grown to such an extent that adequate inspection and control by the Inspector-General of the medical institutions, now numbering nearly 1,000 in the department, have become practically impossible. Rural dispensaries number 364, including nine subsidized ones. In 1937 the rural dispensaries in five districts were successfully transferred to the control of the public health department, so that medical officers in charge of them might also do public health work; the usefulness of each dispensary extends well outside its own controlling area. The annual report for 1938 states that considerable attention was paid during that year to the supply of medical aid to women by members of their own sex. There is still an insufficient supply of Punjabi women doctors.

Correspondence

Science in War

SIR,—Your admirable leading article (August 3, p. 158) and Dr. Norman Macfadyen's comment upon it (August 10, p. 207) suggest many reflections. I think the explanation of our practical inferiority is contained in your remark: "Moreover, the Germans are not afraid to talk about the application of new knowledge to military science; and, as most of them have had military training, few such applications are overlooked." This might be supplemented by the remark that no ethical considerations whatever would restrain a German from using *any* weapon which, in his judgment, might give him a decisive military advantage. The result is that (*a*) powerful persons are more receptive of ideas, and (*b*) no ideas, however repulsive, are rejected on ethical grounds. The paradox to which you allude—namely, that the Nazis, who despise the scientific spirit, have made more use of science than we—is not, I think, a paradox but an explanation. We are to a great extent ruled by men of literary and philosophical education who have a real enthusiasm for things of the mind and respect the generalizations of modern science—they read and admire the popular writings of, say, Eddington and Jeans. But they have no knowledge at all of scientific technique, and do not perceive that the generalizations which would have delighted Aristotle or Plato could only have been reached by men of consummate technical skill. They would not think of asking an Eddington or a Jeans to apply their powers to the destruction of human beings, and would not know that their knowledge was utilizable for war work. The Nazi, with as much interest in generalizations as a hog in the age of a beech the mast of which he devours, insists on setting the best brains he can find to *military* work and, within quite wide limits, gives the scientific man his head, allows him to select his own problems provided they are military. Taking a long view, a view over generations, this is disastrous; it means the end of science—the old story of the practical Romans following the unpractical Greeks—but it works well in the immediate present.

Our fundamental weakness is that scientists are not given their heads, are not encouraged to propose problems. Many years ago a scientific statistician in the public service, now dead, said to me: "I should like to be free from all routine duties, just allowed to meditate over the data and, when something struck me, permitted to make a special inquiry, even involving new tabulations." He knew, as well as I did, that such a proposal would not have been listened to. But he was quite right; he could have done the State a great service in that way. If in our so secret military services there were intelligence officers in the proper sense of the term, not charged with administrative routine, but having access to all information, if, when an idea came to them, they were allowed to develop it, perhaps we should not always have to wait and see what the enemy will do.—I am, etc.,

Loughton, Aug. 10. MAJOR GREENWOOD.

Immobilization for Infected Wounds

SIR,—Drs. J. Trueta and J. M. Barnes (July 13, p. 46) give their reasons for advocating complete immobilization in a plaster cast for the treatment of infected wounds. There can be little doubt about the value of this method for preventing the spread of organisms or their toxins from the infected area, but it is possible that the good results they obtained may well have been due to other factors of which they make no mention.

The most important of the organisms responsible for septic infection of wounds are the haemolytic streptococci, and in a previous paper (Hare, *Lancet*, 1940, **1**, 109) it was pointed out that only strains belonging to the serological group A are likely to be of importance in this respect. Trueta and Barnes mention that during the Spanish Civil War "in the majority of cases streptococci could be grown from the discharges coming from the wounds," and they consider that the absence of severe streptococcal infection in their cases was due to the immobilization procedures adopted. Unfortunately they do not mention what variety of streptococci were encountered. It is quite true that many wounds have streptococci in them, but it is very doubtful whether more than a small proportion of the strains are pathogenic. For instance, in an investigation now in progress, Dr. Reba Willitts and I have found that *Strep. viridans* is a comparatively common inhabitant of the wounds of civil life (and that they are probably derived from the skin). But symptoms suggestive of an active infection by these strains practically never occur. Beta-haemolytic streptococci, too, occur comparatively often, particularly in wounds sampled some time after infliction. Some of these strains are, of course, members of Group A, and the associated signs of infection are usually clear and unmistakable. But many of these strains are not members of Group A (usually belonging to Groups B, C, G, or H), and the wounds from which such strains are derived are seldom, if ever, severely infected. For these reasons it is probable that the majority of the streptococci isolated by Trueta and Barnes were not haemolytic streptococci of Group A, and because of this would probably not have been actively pathogenic under any circumstances.

It was also shown in my paper referred to above that haemolytic streptococci of the important Group A are probably not present in most wounds at the time of infliction, but that they are almost certainly introduced into the wound some time later, either from the nasopharynx and hands of an attendant or by aerial transmission from neighbouring infected cases in the same ward. Since this paper was published, considerably more evidence in favour of this view has been obtained. Now the whole technique employed in Barcelona was, unwittingly perhaps, of such a nature as to deny access of haemolytic streptococci of Group A to the wounds. Thus the wounds were thoroughly cleansed, excised, and débridement carried out as soon as possible after infliction by operators wearing masks and gloves in the more or less sterile atmosphere of the operating theatre. The absence of any further dressing, inspection, or manipulation of the wound militated against the ingress of haemolytic streptococci from the nasopharynx or hands of dressers during the subsequent period. And the cast extending far on either side of the wound undoubtedly sealed it against air-borne contamination from neighbouring infected wounds. Thus the absence of severe streptococcal sepsis in Spain may well have been due to the fact that Group A haemolytic streptococci were unable to gain access to the wounds by reason of the technique employed rather than that these organisms were present in the wounds but failed to become invasive because the area was immobilized in plaster.—I am, etc.,

University of Toronto, Aug. 1. RONALD HARE.

Gastric Disorders in the Services

SIR,—In view of recent correspondence about gastric disorders in soldiers, the following particulars of the *x*-ray findings in the first 500 officers and men suspected of having gastric disorder who have been examined at a military hospital since September 1, 1939, may be of interest. The findings do not include re-examinations, and operative confirmation has been possible only in a few cases.

Age Group:	Under 20	20–29	30–39	40–49	Over 50	Total
Ulcer on the lesser curve	1	8	7	4	2	22
Juxtapyloric ulcer	—	7	19	16	7	49
Duodenal ulcer	1	48	61	27	6	143
Old gastro-enterostomy	—	—	4	3	1	8
Old partial gastrectomy	—	—	1	—	—	1
Old gastrectomy showing ulcer	—	2	3	1	1	7
Appendix lesion	1	4	4	2	—	11
Total of lesions found	3	69	99	52	18	241
Negative examinations	9	114	84	43	9	259
Total examinations	12	183	183	95	27	500

A history of operation for perforation was obtained in fifteen of the 500 patients, and of these nine were classed as radiologically normal. The lesser-curve and duodenal ulcers in the "under 20" group were both in patients aged 17. Two of the negative examinations in the "40–49" group were

of patients who showed advanced bilateral phthisis on the routine screen examination of the lungs. It is interesting to note that no case of neoplasm was found in this series, nor has one been found in a further 150 gastric examinations performed since this series was completed.—I am, etc.,

HUGH MORRIS, M.D., D.M.R.E.,
July 11. Major, R.A.M.C.

Treatment of Air Raid Casualties in Practice

SIR,—In answer to the questions by "E.M.S." in the *Journal* of August 10 (p. 204) we would like to emphasize first of all that the series of cases reviewed by us (August 3, p. 147) were reported from the point of view of surgical treatment rather than from that of organization. Since, however, the organization and distribution of these patients are extremely important, we will not only answer these questions but will stress points which we consider are of particular importance.

The cases were admitted straight to hospital (C.C.S.) after a preliminary dressing had been applied in most of the cases by the trained first-aid personnel where the casualties occurred. There is a first-aid post at the hospital, so M.P.C. 46 forms were filled up in the reception room there. The clerk filled in the name and address of the injured (if it was obtainable), and a senior surgeon assessed the injuries and distributed the cases for treatment. Clothing was to some extent cut off here, and the first-aid dressings removed sufficiently for the surgeon to inspect the wounds and to arrange for the allocation of the cases as follows:

1. Head, chest, and abdominal injuries to two wards (male and female) under the charge of general surgeons.
2. Injuries mainly confined to the limbs and back to two wards (male and female) under the care of the orthopaedic surgeons. (It was in this category that the twelve cases reported were classed.)
3. A special ward for moribund cases.
4. The mortuary.

An organization on these lines does enable all the cases to be seen at an early stage by an experienced surgeon, who makes the preliminary diagnosis, and when the case arrives at the allotted ward measures to combat shock can be instituted without delay. The surgeon who proposes to operate can see the case in the ward or the ante-room to the theatre as he wishes. Our view is that it is best for the surgeon who is to operate to see the cases in the wards, to make a list of them, and to decide the time for operation himself. As long as anti-shock measures are being taken and the wounds have received a preliminary dressing (sulphanilamide pack), then the cases need not be hurried to the theatre; in fact we feel that a delay at this stage is essential for the severely shocked patients. When the patients are under anaesthesia further clothing will be cut away if it is required.

The Question of Time.—The local ambulance arrangements were extremely quick and efficient. The site of the bombing was about half a mile away from the hospital (C.C.S.) and over fifty cases were received in half an hour. The treatment of shock was being carried out in these cases in an average of half an hour under hospital conditions, and, actually, operations were carried out in the twelve cases reported after a lapse of two and a half hours on the average, the more severely shocked cases being deliberately delayed until the end of the session, or longer if their condition required it.

Lastly, we would like to draw attention to the need for unity of control and continuity of treatment in these cases. When the cases have been transferred to the near-by E.M.S. hospitals (base hospitals) the same surgeon who has performed the operation should have a free hand in the after-treatment of the patient so long as this can be readily arranged; they should not be under the care of a doctor who is not engaged in the practice of surgery. This, of course, does not apply to those cases which are transferred to more distant centres where other competent surgeons are available, but any interruption in the control of the case should be avoided so far as possible.—We are, etc.,

A. R. HODGSON.
Aug. 12. G. K. MCKEE.

Injection Treatment of Muscular Rheumatism

SIR,—In his article on the treatment of muscular rheumatism in your issue of August 10 (p. 183) Mr. Martin Button has rediscovered the method introduced by myself some twenty years ago, and described in the *British Medical Journal* of November 17, 1923, under the title "Acute Lumbago treated by the Injection of Quinine and Urea."

I fully endorse what he says as to the efficiency of the method in all forms of fibrositis, but especially in the acute varieties. There is, however, a great advantage in the use of analgesic substances of more lasting effect than novocain, and I have found an oily solution such as A.B.A. or proctocaine most satisfactory. The effect of these lasts for several days, and as during this period normal movements can be made without pain the acute fibrositis quickly subsides. The relief in a severe case of acute lumbago is dramatic in the extreme, the patient passing from rigid immobility to complete freedom in a few minutes. Such a simple and effective method deserves a far more extensive use than it has ever received.—I am, etc.,

London, W.1, Aug. 13. H. S. SOUTTAR.

V.D. Prophylaxis for the Troops

SIR,—In reply to Colonel P. F. Chapman (August 3, p. 169), I can assure him that the Army authorities are fully alive to the V.D. situation, and that if the picture he paints in the first paragraph was true of the last war it is certainly not true of the present one.

Admittedly it is useless to rely entirely on chastity; nevertheless, this virtue is strongly encouraged in the Army to-day. Prophylactics are *not on sale* in canteens and leaflets are *not* circulated. All soldiers receive talks and lectures on the subject in which stress is laid, among other things, on maintaining a high moral standard and on abstention from illicit sex relations; in addition, instruction is given in methods to be used for the preventive treatment of venereal disease, and full facilities for this are available free to all soldiers under confidential conditions. Soldiers suffering from venereal disease are under the care of skilled specialists and are treated in a similar way to other sick soldiers. Finally, the incidence of venereal disease in the British Army up to the present has been extraordinarily low.—I am, etc.,

T. E. OSMOND,
Aug. 7. Lieut.-Colonel, R.A.M.C.

Health and Soil

SIR,—Dr. Gavin Milroy says in his interesting letter (August 10, p. 207): "Possibly one reason why animal manure is superior to compost is the extra hormone content derived from the animals' urine." I think that he is probably right, and I wish to make a practical suggestion. If one thinks it out, horse or cow manure consists essentially of (1) undigested vegetable matter (faeces) *plus* litter (straw, etc.); (2) urine. After manure has become well rotted the first item must correspond closely to humus from the compost heap. The second item—urine—contributes those valuable chemical constituents—nitrates, phosphates, and potash salts—in which humus is deficient as compared with animal manure. There are also, I presume, the extra hormones to which Dr. Milroy refers, about which we are only beginning to learn but which may be of analogous importance to the vitamins in food.

The obvious thing to do in order to make the contents of our compost heaps equal to first-class animal manure is to add every morning the contents of the domestic "slop" pail—that is, the nocturnal urine of the household—instead of pouring it down the W.C., a most wasteful practice which in wartime is quite unjustifiable wherever there is a garden of a reasonable size. Having had continuous personal experience of this simple plan for the past seven years or more, I can testify that it can be carried out without the causation of any nuisance or ammoniacal odour whatever. The compost heap constitutes, in fact, an admirable bacteria bed for the rapid conversion of urea into innocuous but very valuable nitrate. Of course, the amount of urine thus dealt with must bear some proportion to the size of the compost heap. In a

large family where there is only a small garden not all the urine should be used, perhaps. Experience will soon enable one to judge what amount can be dealt with.

The question of how to obtain manure for the garden has been becoming acute ever since the displacement of the horse by the internal combustion engine. To-day, in wartime, it has become of paramount importance. Yet here is a simple expedient which, combined with the proper development of compost heaps (or humus pits, as they are sometimes called) in every garden, would go far to solving the problem. The Board of Agriculture has issued a valuable leaflet on "Composts" (Advisory Leaflet No. 289, price 1d.), but the only reference made to the simple plan I am suggesting is in the rather timid and vague statement that the compost heap should be watered from time to time to keep it moist, "liquid manure being used when available"!—I am, etc.,

Leicester, Aug. 10. C. KILLICK MILLARD.

SIR,—Hydroponics is certainly a teaser for the soil expert. If it is true that food can be manufactured in tanks, then there are at least two possible futures for agriculture. Either the soil fertility and with it the countryside can be nurtured and improved, or a revolution can take place, and instead of ploughed fields and market gardens we may find vast hydroponic tanks spreading from farm to farm, much as industrial areas saw factories spread from town to town in the last century. It is to be recognized that one or other development must be expected. In the New World soil erosion has enforced a change in agriculture. Methods are being adapted to conserve the soil, and this means that agricultural surpluses available for export to Europe will increasingly be curtailed. Consequently Europe must increasingly provide her own food. Under the duress of this necessity will she turn to the fertility of her own soils or to hydroponics? Personally I should hate, for aesthetic reasons, to see hydroponics developed on an adequate scale. This point of view does not need much argument. You have only to picture the Vale of Evesham defaced by vast hydroponic tanks to realize what would be lost.

But is there no other argument than the aesthetic against hydroponics? I anticipate that time will show that such an argument exists and that it is conclusive. Although we have evidence that the hydroponic tank can produce food, we have as yet no evidence concerning the nutritional value of the food so produced. The issue resolves itself into the question whether the tomato or other crop grown in the hydroponic tank has the same nutritional value as tomatoes grown on soil adequately fertilized with good humus. The question is not one of opinion but of fact; consequently only experiment can answer it. The experiment which I would accept as crucial would be to produce by hydroponics a complete scientific optimum diet such as McCarrison used for his rats. Following McCarrison, the experimenter should feed a group of animals (say rats) on this diet for five years. A second group should serve as control. This should be fed on the same diet, but in this case the food supply should be raised upon soil adequately fertilized by humus (produced by Howard's Indore process). The morbidity and mortality of the two groups of rats would measure the nutritional value of food from hydroponic tanks.

As the stress of food shortage is likely to force more and more hydroponic products on to the market I invite the Medical Research Council to undertake this inquiry now. That we should have more precise information on the point is urgent not merely from reasons of individual health but also to define more precisely our obligations towards the soil. —I am, etc.,

Coventry, Aug. 11. K. E. BARLOW.

SIR,—What your correspondents, Dr. Astley V. Clarke (August 3, p. 166) and others, forget is that in villages where earth closets are in use there is danger of the garden soil becoming infested with the ova of intestinal parasites. This is the case with two groups of cottages in this rural district. Any family moving into one of these cottages is almost certain to become infested with threadworms or roundworms. Copious liming of the gardens by our medical officer of health seems to have had little effect on this plague.—I am, etc.,

South Godstone, Aug. 5. H. E. GIBSON.

Compound Hypertonic Salt in the Treatment of Septic Wounds

SIR,—The treatment of septic wounds by compound hypertonic salt as described by Mr. C. J. Cellan-Jones (August 3, p. 152) has greatly interested me, for I, too, have found this method of the greatest value. During the years 1935–7 in hospitals in Africa of which I had charge many cases of deep septic wounds were constantly being treated. I tested out many antiseptic solutions in various degrees of strength and combination, and for deep, sloughing wounds found none to compare with the 10% sodium sulphate solution in 1 in 1,000 acriflavine. After many tests it suddenly occurred to me one day to use this very simple and not too expensive solution, and after employing it for a few days I wondered why I had never thought of it sooner. It is physiologically ideal for sloughing wounds and deep abscesses. The condition known as myositis purulenta tropica and all deep intramuscular abscesses cleared up rapidly with a twice daily irrigation in which a certain amount of the solution was left in the wound and a thick dressing applied. I would like to add my testimony to the efficacy of this simple and comparatively painless and quick method of treatment. Unfortunately my notes of cases were destroyed, but recently I found it of great value in the treatment of septic cellulitis of the hand. After the necessary incision a bath in this solution at a temperature just above blood heat and for half an hour twice daily has proved extremely satisfactory.—I am, etc.,

Aug. 6. R. R. MURRAY, M.D., F.R.C.S.Ed.

First-aid Lectures

SIR,—"A County Medical Officer, B.R.C.S." (August 10, p. 204) raises two very important points. In the first, first-aid parties are not being taught too much, but sufficient time and care have hitherto not been given either to the syllabus or to the teaching, and of the teachers many have been called but few should have been chosen. Previous to the outbreak of war and for some time afterwards the aim of the Great Ones was to get as many first-aid workers as possible in possession of a qualifying certificate in the shortest possible time. Six lectures in three weeks or less was the order of the day, the whole of the manuals to be covered! Such a crammed course was futile, especially to folk who were going back to school, so to say, after many years. To say that after due examination they were qualified "first-aiders" showed no appreciation for the beauty of truth, and to let them loose on a confiding public was criminal. The position with regard to practitioner lecturers was as serious; many men were lecturing—or shall I say reading?—who had no real knowledge of first aid, who were neither members of the B.R.C.S. nor of St. John. Under such shepherds the wonder is that the flock in such astounding numbers ever subsequently negotiated the examination hurdle. My contact with first aid is through St. John over a period of over twenty years, and in all humility I confess that I have never found it possible to cover the syllabus as set forth in the "little black book" in the prescribed six lectures, and I am all against the attempt being made. It can be compassed in one or two more, depending on the type of class, but two lectures per week with the necessary practicals is, in my opinion, one too many.

In this city the problem is met for those Mobile A.R.P. personnel taking first aid for the first time by a course shorn of its frills, but rather naïvely including poisons, in which a sound knowledge of fractures, haemorrhage, shock, and the treatment of asphyxia is insisted on. This, well done, is, I believe, all that is required of those functioning at the "site of devastation." First-aid post recruits go through the same course at my post, paid personnel as well as volunteer, later joining the more advanced group to receive instruction in the treatment of such conditions as may be met with in a F.A.P. with its greater resources. Even so, there are many members of first-aid parties who thirst for more, and it is up to the surgeon attached to give it them in successive courses. It will be greatly appreciated.

I am in agreement with the second point. Examiners should be hand picked, but unfortunately there are not enough of them, and in these days, when it is often impossible to fit in

a time suitable for the class, one is chosen who has gained access to the fold by the back door, so to speak. Hence, examination results are sometimes as startling as the questions put to the candidates. The fault often lies with the examiner and not with the questions on his report sheet. These, in the case of St. John, I have always found reasonable; in any case an examiner in his instructions is allowed latitude but not licence. I should imagine that the B.R.C.S. works on similar lines.

In conclusion, there must be thousands of holders of first-aid certificates who are now resting on their laurels. For all A.R.P. personnel who are holders it should be obligatory that they submit themselves for re-examination periodically. Only in this way will they be kept up to pitch and be a valuable national asset.—I am, etc.,

Birmingham, Aug. 12. HORACE S. SAVAGE.

Recovery from Suppurative Pylephlebitis

SIR,—Your correspondent Dr. Richard A. Barlow (July 27, p. 134) reports a case of recovery from acute septic pylephlebitis dating from the days before sulphanilamide therapy. As he rightly says, absolute proof is well-nigh impossible, but the case which I summarize below seems sufficiently clear to satisfy all but the most carping critics. The patient throughout was under the assiduous care of my friend Dr. J. R. Johnson, late of Richmond, and he has kindly sent me some notes to amplify my own.

The patient, a robust man in the early forties, developed acute appendicitis in Scotland, but returned by the night train to Richmond and was operated on by the late Mr. Clayton Greene next morning, the appendix being gangrenous but not obviously perforated. His progress was satisfactory until the tenth day, when he developed an alarmingly high temperature associated with an enlarged tender liver and slight icterus. He was seen in consultation soon after this by Sir Berkeley Moynihan (as he then was), who informed the relatives that it was necessary to say with "brutal frankness" that the patient had less than ten days to live. Despite an exhausting illness, which reduced him to a shadow, he did in fact recover completely. I saw him with Dr. Johnson some three or four weeks after the onset of his daily rigors and was impressed with his good general condition and by the fact that he had survived more than twice as long as had been predicted. Daily rigors persisted for four months, this period being interrupted only by a thorough exploration of the liver and subphrenic area with a large-bore aspirating needle by Mr. Clayton Greene in consultation with Sir Thomas Horder (now Lord Horder), which failed to reveal any purulent collection. The rigors gradually diminished in severity at the end of four months, but an irregular pyrexia continued for a further two months, when he slowly improved and finally recovered completely and is still alive.—I am, etc.,

London, W.1, Aug. 11. CECIL A. JOLL.

Brachial Neuritis following Rubella

SIR,—The suggestion in Mr. Norman A. Sprott's clinical memorandum (August 3, p. 154) on the possibility of rubella taking on a neurotropic form is extremely interesting. After my original letter (March 30, p. 548) a further ten cases of this neuritis occurred in my practice, making in all fourteen, of which thirteen were in women and one in a man of 20. In age the patients ranged from 17 to 47, with an average age of 33. They all sought advice on account of pain and/or difficulty in using the hands. In all the hands were affected, and in two the legs as well. As regards "class" they varied from "labouring" to "county." None gave a previous history of rubella. This is a reception area, and of approximately 300 cases of rubella about half were in children, but notably local children, very few being in those "evacuated."

It seems that the following conclusions may be drawn: (1) A previous attack of rubella protected. (2) The proportion of adults to children infected was unusually high. (3) Adults only were affected by the neuritis. (4) The neuritis was not due to a dietary deficiency.—I am, etc.,

Deddington, Aug. 9. G. M. HODGES.

Chronic Blepharitis in Children

SIR,—The article by Dr. A. T. Elder (August 10, p. 185) on the treatment of the above condition by ung. brilliant green and crystal violet is both instructive and interesting. While I was clinical tutor in ophthalmology at the Royal Infirmary of Edinburgh under Mr. H. M. Traquair I found that a precisely identical form of treatment was used there in 1932 and I think earlier, the actual prescription being: brilliant green, 1/2 grain; crystal violet, 1/2 grain; lanoline, 110 grains. Since that time I have used it extensively in hospital practice and in private practice when the occasion arose. Indeed, it is made up for me in ophthalmic capsules by Messrs. Duncan, Flockhart.

My impressions of the treatment over the last eight years are as follows: (1) It is of very real value in cases of true squamous blepharitis. (2) It is not so helpful in cases of ulcerative blepharitis. (3) I have not in that time seen any case of ill effect from its use, beyond temporary staining of the ciliary margin.

Regarding the occurrence of blepharitis itself, it is my opinion and experience that it is relatively more common in the hospital class of patient than in private practice. This I attribute to the "nutritional" difference, as indeed among hospital cases themselves it is more common in the "strumous" type of child. It is also my opinion that errors of refraction have a definite place in the cause of the condition, and their treatment in its eradication, particularly uncorrected hypermetropia.—I am, etc.,

A. J. CAMERON, D.O.M.S., F.R.C.S.

London, W.1, Aug. 11.

In Defence of Potassium

SIR,—The other day I overheard a colleague asking if, in view of your leading article (July 20, p. 89), potassium salts should not be prescribed any more, and since then I have read Dr. D. Ockman's letter (August 3, p. 170), which shows that he, too, is much impressed. We all know that potassium in the form of potassium citrate in 20-grain doses, t.d.s. or q.d.s., has been prescribed by generations of medical men, not only without harmful effect but with distinct benefit to the innumerable patients concerned. In the experimental work, you speak—if I remember rightly—of 100-grain doses, but how many doctors have prescribed such doses? There may be, for instance, a vast difference in the therapeutic effect of 1/30 of a grain of strychnine and four times that dose, say 1/8 of a grain, or between 1/4 grain of morphine and 1 grain of that substance. Now, if potassium may produce heart failure, so may calcium in sufficient dosage if not balanced by other essential ions, and actually the balance of sodium, potassium, and calcium is essential for the normal beat of the heart.

Dr. Ockman rightly draws attention to a list of foods high in potassium content, but they do seem to be old friends in the world of men, don't they? A little thought will surely convince us all that, with the exception of those containing meat extractives which in some conditions are better avoided, they must be harmless in usual quantities. It is perhaps instructive to note here that the urine of a healthy adult on a mixed diet contains 2 grammes per litre of potassium, 4 grammes per litre of sodium, and 0.2 gramme per litre of calcium.

This is not the first time that potassium has been accused of being "the nigger in the wood pile." It was suggested that it was the cause of death in intestinal obstruction, but it was later shown that there was actually often a decrease rather than an increase of potassium in the blood in this state. Moreover, Keith and Ringer have deliberately raised the potassium in the blood in a group of normal individuals without ill effect. It has, of course, been made clear that a low potassium diet is of great value in Addison's disease, and that animals whose adrenal glands have been removed may be maintained by a low-potassium–high-sodium diet providing sodium citrate be added to prevent acidosis. But potassium should not be condemned because of this, any more than sugar should be condemned because of its effect in diabetes mellitus before the days of insulin. Finally, nerve fibres are very rich

in potassium because it plays an important though ill-understood part in nerve activity. It is known, for instance, that it is closely associated with acetylcholine in the transmission of impulses from the sympathetic preganglionic fibre and the ganglion cell.—I am, etc.,

Clifton, Bristol, Aug. 3. FREDERICK SUTTON.

Treatment of Inguinal Hernia in Adults

SIR,—I was greatly impressed by the extraordinarily good results reported by Mr. John F. O'Connor (July 27, p. 113) in his series of operations for indirect inguinal hernia. In his list of the causes of failure I feel he has cited just four too many. I feel sure that the essential cause of recurrence is, as he describes it, insufficient and improper suturing of the internal abdominal ring. I have seen many recurrences following Bassini's operation and its modifications, but in almost every case there was no giving way of the tissues. There was always, however, a sac. I feel sure that it is almost immaterial what type of so-called repair is used. If no sac re-forms there will be no recurrence. If a sac re-forms at the internal abdominal ring it will eventually find its way out. Even the operation which he describes will not prevent this, as it is manifestly impossible to close off the internal abdominal ring in the male completely without strangulating the cord. Mr. O'Connor's magnificent results are due to the meticulous care with which he closes off the peritoneal neck of the sac, and his appreciation of the necessity for proper planning and careful execution of every detail of the operation.

If this be done, possibly augmented by a fixation of the sac stump behind the abdominal wall, as performed by McEwen, there is no need for any "repair" in adults any more than in infants beyond closing the slit external oblique either with or without overlapping.—I am, etc.,

Belfast, Aug. 6. C. J. A. WOODSIDE.

Nocturnal Enuresis

SIR,—The variety of opinions as shown in your correspondence columns as to the cause and cure of enuresis in children would seem to suggest that probably too much attention is being paid to such things as the environment and too little to the subject. That bed-wetting is a habit which demands during the subject's waking hours simply an effort "with might and main" to cure, one fears is not the whole truth. One cannot imagine any human being willing to lie in the, to put it mildly, acute discomfort of his own liquid excretion, even if one can forget the no less acute discomfort of the foul-smelling bedclothes and the constant criticism and shame involved by this nocturnal and sometimes diurnal performance.

If the enuresis is nocturnal, then surely the child, poor creature, should be absolved from any conscious blame for its disgusting performance. If diurnal, then one feels that the reflex nervous system, as apart from the higher centres, must be incriminated. The act of micturition is said to depend upon the functioning of the autonomic system through the nervi erigentes, that of the act of retention through the sympathetic presacral nerves, and the voluntary control through the pudic nerves. Micturition in the adult and the normal child after infancy is said to be a voluntary act only in so far as the voluntary musculature "lets go" at the call of the autonomic detrusor urinae itself without the control of the subject. Surely, then, Sir, it is the call of the autonomic system which, for example, wakes one with the desire to micturate. Only if the voluntary control is deficient or, on partially wakening, is inadequately exercised will in the average case enuresis take place.

Since in a series of cases some authorities find one-third both nocturnal and diurnal, it would seem that the weakness must either be of the nature of "laziness," which seems to one extremely doubtful considering the discomfort to the subject, or, more likely, a definite nervous lesion, functional or otherwise, and of varying degree, of the cerebrospinal system, be it in the higher or lower centres, which controls the voluntary "letting go" of the urine. In a general way this view is supported by the scientific survey of Dr. Samuel E. Gill (August 10, p. 199), who in nearly a hundred cases found that the only common factor was a low social standard (which rather strangely, he says, is probably inherited), and the only other definite fact that two-thirds of the children were of low school attainment, thus inculpating the cerebrospinal system though at its higher levels.—I am, etc.,

London, N.6, Aug. 10. W. LEES TEMPLETON.

SIR,—There has been so much speculation in the *Journal* lately on the subject of enuresis that I would like to make some personal confessions which may help the unfortunate doctors who have to treat these cases.

From infancy I wet the bed with disgusting frequency. I saw several physicians and took lots of belladonna without any result. If I was made to micturate last thing at night, when my parents came to bed, I was all right, but was no good when left to myself. In the last war I was evacuated with very salutary effects, for I was much more scared of my aunt than of my father, who had told me that he did the same when he was a boy. Nevertheless, I had occasional lapses, and got soundly beaten for them. At boarding school I was all right for two terms, but again, as I got more used to my surroundings, I lapsed into my lazy habit. I would dream that I had got up and used the chamber, and would wake up in a pool immediately after, cursing my lot . . . but I always knew that with a little more effort I could have woken that split second sooner. I was spontaneously cured at puberty, and neither of my children suffers, I am glad to say.

As to one or two points raised by Dr. Samuel E. Gill (August 10, p. 199), the child does not lie comfortable and happy because he has wet his bed; he wets because he's too comfortable and sleepy to get up. Shame is always present, but it gets a bit attenuated after many years! (N.B.—I write under a nom de plume.)

I was not below standard in scholastic attainments; in fact, I believe that bed-wetters are a very crafty lot, and much too clever for their distracted parents. Lack of will power is the cause of the condition, with lack of self-respect not far behind.—I am, etc.,

Aug. 9. A. B. C.

Obituary

SURGEON REAR-ADMIRAL ERIC PEARCE GOULD

An old friend and fellow student writes: The untimely death of Eric Pearce Gould has come as a grievous blow to his many friends. Though a surgeon of the highest skill and a teacher worthy to rank with his father, it is for his other great qualities that he will perhaps be best remembered. In him was to be found a rare combination of gifts, high purpose, fine courage, a clear logical mind with an unusual facility for lucid expression, and a gay humour. He would have made his mark in any walk of life, but in none so abundantly as in his chosen profession, for it gave him those opportunities for service—service to his Maker and to his fellow men—which was the keynote of his life.

Eric Gould inherited a name well known in medicine; he followed at the Middlesex Hospital a father of great distinction. He was not unmindful of the disadvantages as well as the advantages of being his father's son, but by sheer force of character he made a reputation for himself which, while owing something to his inheritance, was yet supremely his own. His advice was widely sought, for he had the faculty of seeing clearly the essentials of any problem and his judgments were sound. His patients were ever his great concern; rich and poor alike being treated with the same consideration and the same skill, and it was his habit, when opportunity offered, to talk over his cases with his friends to their mutual advantage. His surgical skill brought relief to much bodily suffering, his wise advice comfort and ease to many minds. Gould, though not a countryman, was a great lover of the beauties of Nature, and his high spirits and infectious enjoyment of the best things in life made him an ideal companion on a holiday. In his home life he was singularly happy, and to her who so fully shared this life with him our deepest sympathy goes out. Though far from robust, he possessed exuberant vitality and

a great capacity for work. During his later years he was handicapped by indifferent health, but he never spared himself, and finally, when serving in the Royal Navy for the second time, he made the supreme sacrifice. It is with aching hearts that we bid him farewell, and on that Saturday afternoon in the West Country the beauty of the day, with its sunshine and cloud and a wind blowing off the moor, seemed to typify the fine spirit of him who was laid to rest. Surely "nothing is here for tears; nothing but well and fair."

Dr. JOHN HILL, who on June 17 lost his life while at his post in the dispensary of H.M.T. *Lancastria* attending the wounded, was the oldest son of Dr. James Hill, forty years in practice at Renfrew. John Hill was educated at Hillhead High School and at Glasgow University. While still a student, in the last war, he joined the Cameron Highlanders. On his discharge from the Army as the result of war injuries he resumed his medical studies and graduated in 1919, proceeding to the M.D. in 1936. After his house appointments he joined his father in 1920, with whom he remained until 1929, when he joined the Cunard Company. He served in several of the liners, and eventually was given charge of the *Aquitania* in 1935, where he remained until the outbreak of war in 1939. Though he wished to join the R.A.M.C. he was prevailed upon to remain at sea, where his long experience would be of most avail. All that he desired was that he should be placed where he could be of the greatest service to his country. It was he who was in medical charge of the *Queen Elizabeth* on her maiden and secret trip. Soon afterwards, on his return to this country, he went to H.M.T. *Lancastria*. Hill was six feet four inches in height, of slender build, with a fine and scholarly head. As a ship surgeon he became eminent for his breadth of mind, his intellectual attainments, his quiet humour, and his entire devotion to duty. He had quite an unusual facility for writing. His articles to the *British Medical Journal* and other journals were models of easy style, terse expression, and sound knowledge. His loss will be felt acutely by a host of patients and friends on both sides of the Atlantic. He leaves a widow and two children. Mrs. Hill, before her marriage, was herself a doctor—Grace L. Hunter, M.B.

By the death on July 30 of Dr. HERBERT CHRISTOPHER MALE the medical profession has lost a most venerable member and Edinburgh University a distinguished graduate. Dr. Male qualified from Edinburgh in 1880, taking his M.B., C.M. with first-class honours. His first appointment was as house-surgeon to the Leith Hospital, where he devoted himself to the care of cases of typhus fever, which was then rife. Then followed a period at the Royal Maternity Hospital, Edinburgh, where he was house-surgeon, and at the Morningside Mental Hospital. In all these appointments he showed the same ability and conscientious devotion to duty. On his return from a voyage round the world he took his M.D. and then started in practice at Grays, Essex. While at Grays he was medical officer of H.M. Training Ship *Shaftesbury*. After some years he joined an old friend, Dr. Philips, in partnership at Croydon, where he became physician, afterwards consulting physician, to the General Hospital. During the war of 1914–18 he was civil medical officer to the Croydon War Hospital. Dr. Male never married, and after he retired he went to live at West Southbourne, Bournemouth, interesting himself there in social welfare work. He was fond of boating, and had a small yacht on the Thames Estuary; he was also fond of golf, and especially devoted to fishing in Scotland, Ireland, and Norway. He had a lovable personality, and his passing will be keenly felt. He had been a member of the B.M.A. for fifty-seven years.

Dr. RICHARD HAMBURGER, whose death we announce with regret, sought refuge in this country in 1933. He brought with him all that was best in the great tradition of German medicine: a passionate loyalty to the science of medicine, wide knowledge, and an avoidance of the cheap and commonplace. His standing as a paediatrist is attested by the high academic honours he held in his native country and the reputation that he had gained internationally. He made one of the two first independent observations of the relations between Tay-Sachs disease and Niemann-Pick disease, observations that have fundamentally affected our whole conception of the lipoidoses. He was, however, essentially a practical physician, and it was a joy to observe him at work. It was my good fortune to be associated with him in an investigation on the significance of tuberculosis in phlyctenular ophthalmia, a subject of which ophthalmologists took too narrow a view and of which paediatrists were too uncritical. It was just the qualities that Hamburger possessed that were necessary to evaluate the problem. He was destined to give to British medicine a short five years of his mature experience and judgment, and under difficult conditions he amply repaid the debt he owed to the country of his adoption. In his personal life Hamburger had the reticence of achievement and solidity. His was the persistent influence that strength and integrity of character exercise on friends and acquaintances, who will not find his loss easy to bear or to forget.—A. S.

The Services

DIRECTOR OF MEDICAL SERVICES IN INDIA

Major-General W. H. Hamilton, C.B., C.I.E., C.B.E., D.S.O., I.M.S., Honorary Physician to the King, has been appointed Director of Medical Services in India.

DIRECTOR OF MEDICAL SERVICES, ARMY MEDICAL SERVICES

Colonel P. S. Tomlinson, D.S.O., late R.A.M.C., has been appointed Director of Medical Services, Army Medical Services, and is granted the acting rank of Major-General.

MENTION IN DISPATCHES

In a supplement to the *London Gazette* issued on August 9 Surgeon Commander George Lee Ritchie, M.C., R.N., is recorded as mentioned in dispatches "for untiring devotion to duty in attending to casualties after having himself been rescued."

CASUALTIES IN THE MEDICAL SERVICES

Missing

Lieut. Ferdinand Duval, R.A.M.C.

Prisoner of War

Major William Eldon Tucker, R.A.M.C.

DEATHS IN THE SERVICES

Lieut.-Colonel ALEXANDER ANDERSON, R.A.M.C. (ret.), died at Bath on July 26, aged 96. He must have been one of the oldest men, perhaps the oldest, surviving of that corps. He was born in Canada on October 17, 1843, the eldest son of the late Mr. James Anderson of the Hudson Bay Company, and was educated at McGill University, Montreal, and in Edinburgh, where he qualified L.R.C.P. & S. in 1867. Entering the Army as assistant surgeon in 1867, in the old regimental days, he served in the 105th Foot, now the second battalion of the King's Own Yorkshire Light Infantry. He became lieutenant-colonel after twenty years' service, and retired on October 1, 1898. He served in the Afghan War of 1878–9 with the R.H.A., when he took part in Lord Roberts's famous march to Kandahar, receiving the medal and the special star given for the march. He also served on the North-West Frontier of India in the Miranzai campaign of 1891, receiving the Frontier medal with a clasp. He was the cousin of General Sir James Outram, known as the "Bayard of India." He leaves a widow, two sons, and four daughters. His eldest son, Captain A. C. Anderson, of the 6th Jats, was killed in action in 1914.

A. Bernstein (*Medicine*, 1940, **19**, 87) states that infectious mononucleosis, otherwise known as glandular fever, has a world-wide distribution. In addition to Europe, America, and Australia cases have been recognized in Egypt, the Falkland Islands, Trinidad, the Philippines, Hong Kong, and Japan. Most of the epidemics have occurred in the spring and autumn; cases in the summer are rare. From the earliest reports it has been emphasized that the disease is largely one of children and young adults. It is generally agreed that males are more susceptible than females. As regards race, only one case has been recorded in a negro. The mortality is *nil*, and no serious sequelae have been recorded.

Universities and Colleges

UNIVERSITY OF CAMBRIDGE

At a Congregation on August 5 the following medical degrees were conferred:

M.D.—*H. T. Cox, *J. F. Goodall, N. G. Hulbert, E. T. O. Slater, C. L. Stote.

M.B., B.CHIR.—*M. H. K. Haggie, *J. C. K. Campbell, *J. H. Keesey, *J. R. Tasker, *P. D. T. Roper, R. L. Canney, P. Haden, *R. C. Jack, *J. F. Paxton, *W. R. B. Dickinson, *T. S. S. Gregory, *R. R. Hunter, *T. E. Jones-Davies, *J. A. N. Lock, *J. M. Marchant, *R. S. Monro, *H. V. Morgan, *A. G. Porter, *R. A. Shooter, *G. T. G. Thomas, *G. K. F. Cohen, R. M. Todd, *B. N. Brooke, E. E. Jones, *G. A. Ballance, *J. M. Pullan, *L. J. Bendit, *A. G. G. Long, *G. E. Spear, *H. J. Anderson, *P. J. Crowley, *T. A. Kemp, *W. L. Price, *R. C. Howard, L. B. G. Bennett, B. F. H. Parker-Wood, *J. A. Campbell, *R. V. Dent, *B. C. H. Luker, *A. D. Payne, N. Southwell, *R. G. Benians, *R. Crawford, *G. J. Laws, *D. Scott, *J. F. Smith, P. E. Perceval, *G. S. Gladstone, *M. W. W. Wood, *J. H. Humphrey, *S. R. Reynolds, *C. H. C. Upjohn, *L. R. S. Taylor, *H. T. Calvert, *R. T. Hastings-James, *L. W. Smith, A. J. Moss-Blundell, *G. E. Stein, *R. Friedman, *H. Rabinowitz.

*By proxy.

Medical Notes in Parliament

The Workmen's Compensation (Supplementary Allowance) Act received the Royal Assent on August 8.

Medicines and the Purchase Tax

The Finance Bill was considered on August 8 by the House of Commons in committee. On Clause 18 (Charge and Commencement of Purchase Tax) Sir KINGSLEY WOOD said that if he accepted an amendment to exempt medicines he would lose a taxable field of £20,000,000. If he accepted a proposal that taxable goods bought by local authorities should be free of tax he would have to accept it in the case of their hospitals, and would then be asked, "Why not for voluntary hospitals?" and if he allowed it for these, then "Why not for other institutions supported by voluntary contributions?" He would get into an impossible position if he set up a privileged class of buyers, but he hoped to meet some amendments dealing with the classification of particular goods.

Sir HENRY MORRIS-JONES said Sir Kingsley had omitted food from the schedules on the ground that it was a necessity. Medicine was also one. Mr. AMMON brought up a new clause to exempt purchases by local authorities. Sir KINGSLEY WOOD repeated his argument about hospitals and the proposed clause was rejected.

Mr. STOREY moved a new clause to exempt goods purchased on the order of and for the use of a hospital, not being an institution carried on for profit, which provided medical or surgical treatment for in-patients. He said he did not believe Sir Kingsley wished to raise revenue by appropriating part of the voluntary subscriptions to hospitals. In Canada, which had a Sales Tax, articles and materials for use in bona-fide hospitals had been exempt since 1931. The definition of a hospital which he proposed had been found practicable under the Road and Rail Traffic Act, 1936. Captain ELLISTON said the drug bill of the London County Council hospitals was £280,000 a year, and the Purchase Tax would increase it by £45,000. He pointed out that the tax would not be levied on spectacles or lenses. The modern treatment of disease should also be free from taxation.

Sir KINGSLEY WOOD pointed out that ordinary medicines and drugs were taxable at reduced rates, and expensive medicines were to be free of tax. Medical and surgical instruments were exempt, as also were the specialized hollow ware used in hospitals. Dentists' chairs, operating tables, special furniture, clinical thermometers, surgical glassware, and surgical bandages were exempt. Taxable goods of a hospital represented less than 10% of its annual expenditure.

The amendment was negatived.

On August 13 Sir FRANCIS FREMANTLE moved an amendment to exclude from the Purchase Tax aids to hearing duly approved by the Ministry of Health. Sir KINGSLEY WOOD said that he would give consideration to the whole question. He proposed, on the report stage, to introduce an amendment to exclude from the tax altogether surgical and medical appliances. He had already excluded artificial limbs and special jackets. Sir FRANCIS FREMANTLE said that there were many fraudulent devices which, he hoped, would not be exempted by the Chancellor. Sir KINGSLEY WOOD: Yes, I am anxious to see to that to protect the medical profession. The amendment was withdrawn.

Mr. WOOLLEY moved an amendment to exempt drugs and medicines, manufactured or prepared, and medical and surgical appliances. He also urged that anaesthetics should be placed on the free list. Mr. WAKEFIELD seconded the amendment, and Mr. BARNES, supporting it, urged Sir Kingsley Wood either to remove the stamp duty on patent medicines or exempt them from the Purchase Tax.

Sir KINGSLEY WOOD said that the patent medicines tax contained a considerable anomaly. He could not at present embark on a solution of the problem, but before the next Finance Bill he would get the parties together and try to find some real solution to a position which was impossible. He could not, however, at this stage exclude this class of medicines or drugs. Nearly all the things referred to by Mr. Woolley would be covered by a particular list, which would come forward on a section of the Finance Bill which allowed the Treasury to make the necessary definition in the terms of registration. This would come before the House of Commons for approval. The list would be composed in consultation with the Ministry of Health, and could be added to in the light of experience.

Eventually Mr. Woolley's amendment was withdrawn, on Sir Kingsley Wood's undertaking to put before the House at a later stage a detailed list of the exempted appliances or drugs.

Newspapers Exempt from Purchase Tax

On August 13 Mr. ISAACS moved an amendment to exempt newspapers, books, and periodicals from the scope of the Purchase Tax. Sir KINGSLEY WOOD, in reply, said not only a free Press but a widely distributed Press was a vital factor to-day, and he did not feel justified in maintaining the tax on newspapers in present circumstances. As regards books there was undoubted importance in the export trade, which depended on success in the home trade. There was also the need for the continued spread of British thought and expression abroad. In view of these considerations he agreed that books should be exempt. This decision applied to periodicals.

Vitamin A in Miners' Butter Ration

On August 6 Mr. PARKER asked the Parliamentary Secretary to the Ministry of Food whether he would arrange extra rations of vitamin A for miners, lorry-drivers, and others working in darkness, in view of the fact that vitamin A was essential for vision in the dark and that Durham miners free from nystagmus were eating thirteen ounces of butter a week on an average before the war, and that the joint ration of butter and margarine was now only six ounces a week. Mr. BOOTHBY said he was unable to accept the suggestion that an extra ration of butter and margarine for these workers was necessary, particularly in view of the valuable sources of vitamin A, such as carrots and green leafy vegetables, which were readily available. The two-ounce ration of cooking fat might be taken in the form of margarine, in addition to the joint butter and margarine ration of six ounces.

Assistant Hospital Officers

On August 6 Mr. GROVES asked the Minister of Health whether he was aware that there was not unanimity of opinion as regards the knowledge of the medical and surgical requirements possessed by the assistant hospital officers whose duties included the inspection of first-aid posts; and whether he would state the precise experience and qualifications for the appointment possessed by each of the twelve appointees, and by whom and when their names were submitted for the appointment. Mr. MACDONALD replied that before taking up duty the assistant hospital officers concerned, who had all had varied medical experience, attended a special course of lectures

in the various aspects of first-aid-post work, including types of air raid injury, first line surgery, casualty transportation, etc. The appointments were made at the beginning of last April from among officers employed as medical instructors in the Home Office, medical officers enrolled in the Emergency Medical Service, and from names submitted by the Central Medical War Committee.

Training of Midwives by Local Authorities.—Dr. SUMMERSKILL inquired on August 1 how many authorities administering the domiciliary midwifery service trained their midwives in the use of the Minnitt apparatus for the relief of pain at childbirth. Mr. MACDONALD replied that forty-four out of 188 local supervising authorities in England and Wales had as at December 31, 1939, made arrangements for training midwives in their areas in the administration of analgesics at childbirth. He had no power to give directions to local supervising authorities in this matter. He hoped any authorities which had not made such arrangements would consider the desirability of doing so.

Milk Powder for Infants.—On August 6 Mr. BOOTHBY stated that national milk powder had been introduced not to compete with infants' foods already on the market, but solely as a substitute for liquid milk in the limited number of cases where infants under 12 months were certified by doctors as requiring such milk powder in place of the liquid milk provided under the national milk scheme. Welfare centres would, no doubt, still continue to prescribe those infant foods which they had supplied in the past to all children over 12 months and to infants under that age where such a special type of food was required on medical grounds. In the latter case the cost would be borne as heretofore, and not met by the Government under the national milk scheme.

Interned Alien Doctors.—Miss RATHBONE said on August 8 that in Huyton Aliens Internment Camp there were, on July 8, still twenty-six medical practitioners and about twenty-one dentists qualified to practise in the United Kingdom. Sir JOHN ANDERSON replied that he had not yet identified these forty-seven persons, but that if they had not already been released their applications under Category 9 of the White Paper would be dealt with as expeditiously as possible. Those who had permission to remain in an Aliens Protected Area would be allowed to return there.

Production of Medicinal Herbs.—On August 13 Sir REGINALD BLAIR asked whether the Forestry Commissioners since last November had prepared on their own initiative against a shortage of medicinal herbs, and, if not, if he would arrange before it was too late this year to develop the production of medicinal herbs in suitable areas. Mr. D. R. GRENFELL said that the powers and duties conferred or imposed on or transferred to the Forestry Commissioners by the Forestry Acts did not include the production of medicinal herbs. Consequently they had not taken the initiative to develop the production of such herbs.

Notes in Brief

The results of the first six months' working of the Population Statistics Act, 1938, have been tabulated and will appear in the Registrar-General's Statistical Review for 1938, which is expected to be published by the end of September. The information afforded by these figures is new so far as relates to this country. The results are being studied. A commentary upon them will be published as soon as circumstances permit.

Red Cross and medical supplies are not within the categories of goods the passage of which by the Burma road is forbidden.

We referred a year ago (August 12, 1939, p. 366) to the vigorous enterprise of the Queensland Nutrition Council. Believing that, while nutrition is important in time of peace, it is vital in time of war, the Council has enlarged its activities, and its fourth annual report mentions many advances in research and in public and special education for which it is responsible. The main research activity of the Council during the year has been an analysis of the vitamin C content of some Queensland fruit and vegetables, and papers on this subject have been published in the *Medical Journal of Australia*. Arrangements are in hand for an analysis of the vitamin B_1 content of some Queensland foods. Public education has taken the form of nutrition exhibits, bi-weekly broadcasts, and newspaper supplements. Members of the council in their military capacity have reorganized the standard Army ration for camps, which has now been put on a sound nutritional basis. Refrigeration plants have also been installed in all Queensland camps.

Medical News

We understand from the Ministry of Health that there have been no outbreaks of enteric fever in England and Wales as the result of bombing.

The tenth International Congress of Dermatology and Syphilology, which was to have been held in New York City in September of this year, has been postponed indefinitely.

The first Brazilian Congress of Gynaecology and Obstetrics will be held at Rio de Janeiro from September 8 to 15 under the presidency of Dr. Arnaldo de Moraes.

The first Argentine Congress of Puericulture will be held at Buenos Aires, under the presidency of Professor Alfredo Buzzo, from October 7 to 11, when the subjects for discussion will be growth and physical development, psychical development, rickets, legislation and assistance, and prophylaxis of tuberculosis and syphilis.

The second Argentine Congress of Ophthalmology will be held at Rosario next October. The subject for discussion will be ocular traumatology. Further information can be obtained from the general secretary, Dr. Benjamin V. Ré, Santa Fé 1147, Buenos Aires.

At the Congress of the American Academy of Ophthalmology and Otorhinolaryngology which was held last October in Chicago it was decided to create a Pan-American Society of Ophthalmology, the first meeting of which will be held next October. Further information can be obtained from Dr. Moacyr E. Alvano of São Paulo or Dr. Tom R. Yanes of Havana.

During the past two months the Leeds General Infirmary has arranged for discussions on medical and surgical subjects between the staff of the Infirmary and R.A.M.C. officers who have returned from France. The meetings proved popular, were well attended, and afforded an excellent opportunity for interchange of views and information between those who had been serving on the home front and those with actual experience of medical and surgical problems in the field.

Epsom College benefits under the will of the late Mr. George Ernest Waugh. He left £69,249 (net personalty £61,779), and, subject to his wife's life interest, a remainder to the College, as to one-third for entrance scholarships, one-third to augment the headmaster's stipend, and one-third for purposes for which the council would not consider ordinary funds of the College should be spent.

The Central Council of Recreative Physical Training state that under the Fitness for Service Scheme 180 centres have already been arranged. The training includes physical exercises, games coaching, boxing, arms drill with "sticks" to serve as dummy rifles, and squad and foot drill. New centres are being formed, and those who wish to take part in the training but do not know to whom to apply should communicate with the Central Council at 58, Victoria Street, London, S.W.1.

Sir Rupert Briercliffe, C.M.G., has been appointed Medical Adviser to the Comptroller for Development and Welfare in the West Indies.

Dr. N. Goormaghtig, professor of morbid anatomy at Ghent University, has been elected a member of the Pathological Society of Great Britain and Ireland.

The Minister of Health has appointed Miss Z. L. Puxley, O.B.E., to be an Assistant Secretary (Acting) of the Ministry of Health.

Professor Heinrich Zangger, director of the Institute of Forensic Medicine at Zurich, has been made an honorary doctor of the Lausanne Medical Faculty.

A gold medal is to be given by the Japanese Ministry of Welfare to every Japanese who has more than ten children alive above the age of 6 years.

Immunization against diphtheria of children aged from 1 to 10 and the application of Credé's method in the newborn have recently been made compulsory in the municipal institutions of Buenos Aires.

No. 30

INFECTIOUS DISEASES AND VITAL STATISTICS

We print below a summary of Infectious Diseases and Vital Statistics in the British Isles during the week ended July 27, 1940.

Figures of Principal Notifiable Diseases for the week and those for the corresponding week last year, for: (a) England and Wales (London included). (b) London (administrative county). (c) Scotland. (d) Eire. (e) Northern Ireland.

Figures of Births and Deaths, and of Deaths recorded under each infectious disease, are for: (a) The 126 great towns in England and Wales (including London). (b) London (administrative county). (c) The 16 principal towns in Scotland. (d) The 13 principal towns in Eire. (e) The 10 principal towns in Northern Ireland.

A dash — denotes no cases; a blank space denotes disease not notifiable or no return available.

Disease	1940					1939 (Corresponding Week)				
	(a)	(b)	(c)	(d)	(e)	(a)	(b)	(c)	(d)	(e)
Cerebrospinal fever	153	9	35	1	3	25	2	3	—	—
Deaths		2	4				—	1		
Diphtheria	912	38	248	23	17	883	89	134	23	12
Deaths	18	2	5	2	4	20	—	2	2	—
Dysentery	29	3	61	—	—	65	11	20	—	—
Deaths			2	—	—			—	—	—
Encephalitis lethargica, acute	5	—	1		—	4	1	—		—
Deaths		—	1				—	1		
Enteric (typhoid and paratyphoid) fever	77	7	15	2	1	19	2	6	8	4
Deaths	—	—	—	—	—	1	—	—	1	—
Erysipelas		18	38	6	5		23	59	4	3
Deaths		—	—				—	1		
Infective enteritis or diarrhoea under 2 years										
Deaths	31	5	6	5	7	34	9	14	3	1
Measles*	9,623	40	777		22		28	53		1
Deaths	7	—	4	—	—	1	—	—	1	—
Ophthalmia neonatorum	99	5	21		1	106	5	33		1
Deaths										
Pneumonia, influenzal†	425	15	2	3	8	415	26	4	3	2
Deaths (from influenza)	7	1	1	—	1	12	6	—	1	—
Pneumonia, primary			122	7				99	9	
Deaths‡		23		5	8		6		4	8
Polio-encephalitis, acute	5	—				2	—			
Deaths		—					—			
Poliomyelitis, acute	31	—	5		—	23	9	—		—
Deaths		—	—				—	—		
Puerperal fever	6	6	11		2	4	4	12	2	2
Deaths		—					1§			
Puerperal pyrexia	155	13	22		—	191	13	8		—
Deaths										
Relapsing fever	—	—			—	—	—			—
Deaths										
Scarlet fever	1,360	41	116	34	41	1,815	165	173	55	49
Deaths	1	—	—	—	—	1	1	1	1	—
Small-pox	—	—	—		—	—	—	—		—
Deaths	—	—	—	—	—	—	—	—	—	—
Typhus fever	—	—	—	—	—	—	—	—	—	—
Deaths			—	—	—			—	—	—
Whooping-cough*	829	5	47		22		210	25		12
Deaths	3	—	3	—	—	9	—	—	—	—
Deaths (0-1 year)	270	41	59	33	18	256	40	65	17	18
Infant mortality rate (per 1,000 live births)						41	36			
Deaths (excluding still-births)	3,863	669	585	173	112	3,752	701	527	162	125
Annual death rate (per 1,000 persons living)			11.8	11.5	9.8	9.2	9.0	10.7	10.9	11.0
Live births	5,925	971	804	327	230	6,304	1,076	953	344	264
Annual rate per 1,000 persons living			16.3	21.8	20.1	15.5	13.8	19.3	23.1	23.2
Stillbirths	278	35	41			257	42	39		
Rate per 1,000 total births (including stillborn)			49			40	32	39		

* Made notifiable generally on November 1, 1939.

† Includes primary form in figures for England and Wales, London (administrative county), and Northern Ireland.

‡ Since January 1, 1940, figures for London (b) have been for deaths from all forms of pneumonia; the corresponding figures for 1939 relate to deaths from lobar pneumonia only.

§ Death from puerperal sepsis.

EPIDEMIOLOGICAL NOTES

Infectious Diseases for the Week

There have been increases in the incidence of enteric fever, diphtheria, and scarlet fever during the week in England and Wales and in London. The notification figure for diphtheria, which has been steadily increasing in recent weeks, now approaches both the 1939 level and the median value for the corresponding weeks of the years 1930–8. Cerebrospinal fever continues to decline in incidence, but notifications are six times as high as for the corresponding week of last year.

Although enteric infections are widespread, affecting thirty of the sixty-one administrative health areas, in only thirteen were there more than 2 cases—namely, Warwick 10 (Birmingham 5, Coventry 3, Sutton Coldfield M.B. 1, Solihull U.D. 1); London 7 (Hampstead 2, and 1 each in the boroughs of Battersea, Bethnal Green, Holborn, Kensington, and Shoreditch); Lancaster 5 (Burnley 1, Manchester 2, Salford 1, Lunesdale R.D. 1); Stafford 5 (Walsall 3, Aldridge U.D. 2); Chester 4 in Birkenhead; Northumberland 4 (Tynemouth C.B. 1, Newbiggin-by-Sea U.D. 2, Newburn U.D. 1); Oxford 4 in Bicester U.D.; Gloucester 3 in Bristol; Middlesex 3 in the municipal boroughs of Tottenham, Willesden, and Wood Green (1 each); Northampton 3 (Kettering M.B. 2, Wellingborough U.D. 1); Notts 3 (Nottingham 1, Beeston and Stapleford U.D. 1, Eastwood U.D. 1); Yorks, West Riding, 3 (Bradford, Huddersfield, and Leeds, 1 each); Surrey 3 (Coulsdon and Purley U.D. 2, Epsom and Ewell M.B. 1). The Coulsdon and Purley cases belong to an institutional outbreak consisting of 43 cases to date; in 22 of these there were no symptoms or signs of enteric fever, the only proof of infection being the presence of paratyphoid B organisms in the faeces. There were four deaths. Food was regarded as the probable source of infection, but this could not be proved as the articles suspected had been consumed before the first case was detected. The Essex outbreak also appears to have subsided; only 2 cases were notified during the week, 1 each in the boroughs of Romford and Walthamstow, respectively.

Over two-thirds of the cases of acute poliomyelitis were recorded in two administrative areas: Yorks, West Riding, 11 (Harrogate M.B. 7, Pudsey M.B. 2, Knaresborough U.D. 1, Ripon and Pateley Bridge R.D. 1); Lancaster 10 (Blackburn 3, Liverpool 1, Oldham 1, Accrington M.B. 1, Darwen M.B. 1, Huyton with Roby U.D. 1, Ormskirk U.D. 1, Westhoughton U.D. 1). Apart from 3 in Glamorgan (Cardiff 2, Caerphilly U.D. 1), single cases only were reported in Brownhills U.D. (Stafford), Cheadle and Gatley U.D. (Chester), Daventry R.D. (Northampton), Long Ashton R.D. (Somerset), Rochester M.B. (Kent), Stockton-on-Tees M.B. (Durham), and West Kesteven R.D. (Lincoln). As in the previous week, there were no cases in London, compared with 9 and 6 respectively in the corresponding weeks of last year. According to a Press report, yellow fever broke out during the voyage of a Hull steamer after the ship had called at Freetown, West Africa. Four British members of the crew with the disease are being treated at Foyle Hill Hospital, Londonderry.

Registrar-General's Quarterly Return for England and Wales

During the quarter ended December 31, 1939, there were 141,108 live births registered (72,317 males and 68,791 females); of these 5,415, or 3.8%, were illegitimate and 5,681 were stillbirths, or 3.9% of the total births registered. Deaths were 121,431 (62,743 males and 58,688 females) and were 19,677 fewer than births, compared with 21,311, 15,753, and 24,557 in the fourth quarters of 1936, 1937, and 1938 respectively. Infant mortality was 48 per 1,000 live births—14 below the average of the ten preceding fourth quarters.

The *Times* correspondent in Melbourne records the acceptance by Mr. Menzies, the Australian Prime Minister, of a cheque for £A.25,000, collected by the Royal Automobile Club of Victoria for air ambulances. The ceremony took place at a parade of the Australian Air League, which gives preliminary training to boys aspiring to join the Air Force. The president of the club said it had already provided sixty ambulances and promised sixty more.

Letters, Notes, and Answers

All communications in regard to editorial business should be addressed to THE EDITOR, BRITISH MEDICAL JOURNAL, B.M.A. HOUSE, TAVISTOCK SQUARE, W.C.1.

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QUERIES AND ANSWERS

Only Functional

A CORRESPONDENT writes: A busy G.P. would be extremely grateful for any advice in the following unpleasant and distressing heart attacks. Occasionally there will be two or three in one week, and at other times an interval of five or six weeks. The attacks appear to occur without the slightest cause, sometimes even when sitting quietly reading, and at other times when driving a motor car. The last severe attack occurred while I was attending a maternity case, and just after I had administered chloroform and while applying the forceps. When an attack is coming on it begins with a slight vertigo, accompanied by partial blindness, and this is followed by dyspnoea and a mild palpitation. Before long this develops into a severe form of dyspnoea, together with cardiac pain and most violent palpitation accompanied by a damp, clammy perspiration. The attacks vary in length, sometimes lasting only a few minutes, and at other times up to one hour or over, and will cease just as suddenly as they began. I may state that I have consulted two specialists, but got very little satisfaction from either. Both stated that the heart was sound, and that the attacks were "merely functional," and appeared to treat the matter lightly and as though it were not of much importance. I may also state that I have cut out smoking entirely, and, to say the least, this has been and is a great punishment. Alcohol I take, but in moderation. I also avoid any excitement or strenuous exertion. The attacks have extended over a period of some five or six years, and no doubt are functional, but that does not make them any less distressing or easier to bear.

Income Tax

Partnership: Change in Basis of Division

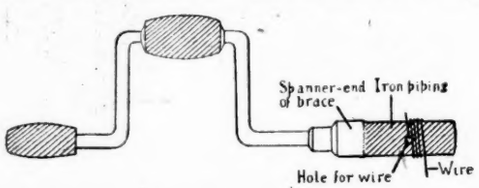
"S." and "B." are in partnership, the division of profits being in half-shares up to October 12, 1939, when "S." joined the Forces, and thereafter 3/4 and 1/4 respectively. As one result "B." finds himself responsible for tax on, say (1/2 of 1/2) + (3/4 of 1/2) = 5/8 of the assessment for 1939–40 and 3/4 of the assessment for 1940–1. It is thought that this is "very inequitable," and a suggestion has been made that it might be avoided by winding up the partnership on suitable terms for the period of the war.

*** In the first place the inequity does not seem very clear or grievous. It is true that the *amounts* of the assessments for 1939–40 and 1940–1 will be determined wholly or partly by earnings of which "S." took a half-share, but they are in respect of the profits for those specific years, during which "B." will take 5/8 and 3/4 respectively of the profits. If the earnings of the practice are maintained he will pay on no more than his income; if his share of the actual profits of those years falls below his share as assessed by more than one-fifth he can claim, under Section 11 of the Finance (No. 2) Act, 1939, to have his assessment adjusted to the actual amount. It would seem that it is only when the "inequity" is such as to fall short of the one-fifth standard that "B." can suffer any hardship. The suggested scheme would involve legal and other costs, and we doubt whether the Revenue authorities would consent to give it retroactive effect as from October 12 of last year. We advise our correspondent to have the Section 11 possibility explored for 1939–40 before incurring the expense of the suggested scheme.

LETTERS, NOTES, ETC.

Removal of Plaster Casts

Dr. D. P. BURKITT (Barnsley) writes: I wish to describe a very simple, cheap, and efficient instrument for removing plasters by the iron-wire method recently advocated in the *Journal*, which I have found to be a very great improvement on the previous routine custom of splitting the plasters with shears, knife, or saw. The only materials required are an old wheel-brace, which can be obtained for a few pence at almost any garage, and a piece of 3/4-inch bore galvanized iron piping about four inches long. The piece of piping is welded on to the spanner end of the brace, and a hole about 3/16-inch diameter is drilled through both sides in about its mid-point. The loose end of the wire is threaded through this hole. The diagram below will, I hope,



render further description unnecessary. This instrument has been devised and made for me by G. and E. Bunker, motor engineers, Plympton, Devon.

Dr. CAMERON FRASER (Church Stretton) writes: Lately there has been discussion on the removal of plaster bandages. The following method, of which I have no personal knowledge, appeared in the *Dental Magazine and Oral Topics* for May, 1935. A Brisbane dentist was asked by a surgeon to remove a plaster bandage. He did so "by a method worth remembering, and which seems to be little known. He made a simple syrup of five pounds of cane sugar dissolved in 2½ pints of boiling water. When cold this syrup is brushed over the bandage and left for a time. The bandage is then easily removed by unwinding."

Hand-seats for Casualties

Dr. FREDERIC SANDERS (London) writes: By all means the ingenious Neate-Potter rope quoit (August 3, p. 168) as a two-handed seat for the opulent, but the hollow rubber one (Woolworths, 6d. each), which is easier on the hands and will support a 15-st. man, for the impecunious.

Hotel Meals for Evacuees

Lieut.-Colonel S. H. FAIRRIE (R.A.M.C., ret.), in the course of a letter, draws attention to what he considers is the effect of the recent order "cutting down the imagined luxurious meals" in hotels. He writes: "In some inland hotels and boarding houses the cutting in half of meals originally served on a bare subsistence standard, which has been the rule since the war started, is resulting in serious underfeeding among the unfortunate refugees from the coast, who have no redress. Such unfortunates, in many cases invalids and delicate people, are compelled to eat unsuitable, twice-cooked, or made-up dishes to obtain a sufficient meal or go without. Perhaps the menus of certain expensive hotels and restaurants in London and in some of the larger provincial cities have been on a luxury basis, but this is certainly not the case in general, nor sufficiently widespread to justify the restrictions now in force beyond those made compulsory by the ration book."

Wanted: Neurological Textbooks for Convalescent Centre

The British Red Cross has established at Middleton Park a convalescent centre for cases treated at a military hospital for head injuries, and the medical officers in charge of this centre, who have returned to active medical work after a period of retirement, would welcome a supply of books for a small library they wish to establish. Would readers who have textbooks on neurology and surgery of the nervous system, or general textbooks that deal with neurological medicine, forward them to Colonel J. P. Cameron, C.I.E., Middleton Park, Middleton Stoney, nr. Bicester, Oxon.

Coramine: A Correction

In our note in the *Journal* of August 10 we stated that "Corvotone" is the analeptic originally introduced under the proprietary name "Coramine," and for which the British Pharmacopoeia Commission have suggested the title "Nikethamide." Ciba Limited point out that coramine is manufactured under Letters Patent and that the name "Coramine," which is a Registered Trade Mark, cannot, without infringing their rights, be applied to any substitute. If any misunderstanding has been caused by the note referred to, we much regret it.